A6 31
293/2 1910

Madras Forest Department

816/E7;3

MADRAS TIMBERS

THEIR USE IN PLACE OF EUROPEAN TIMBERS WITH SUGGESTIONS FOR THEIR CLASSIFICATION

BY

A. W. LUSHINGTON, C.I.E.,

Temporary Assistant to the Forest Commissioner.

266
XLII
103
219
266

PRICE 8 ANNAS

Issued in connection with the Madras Exhibition, 1917
...le-proceeds will be credited to Madras War Fund

TNFA - CBE
Centenary Library
13932

H (a) (i) S10E7;3
64
MADRAS ... COLLEGE
1910
293/2
231

THE MADRAS EXHIBITION, 1917.

Stall Nos. 54 *to* 58.

FOREST DEPARTMENT.

No apology is needed for extracting, almost verbatim, from Schneider's valuable pamphlet on Philippine timbers in the note that deals especially with seasoning timber, as, on the one hand, it seems to apply in almost every detail to the South Indian timbers, as far as my experience goes (indeed it has corrected a few of my preconceived ideas); and, on the other hand, the knowledge of that information is essential for the commercial development of our Madras timbers.

Our aim at the present juncture is to discover if the majority of our Madras timbers cannot be used in the place of European timbers, whether we send our timbers to Europe to help the distressed countries, or whether we utilize them out here in the way European timbers are used in Europe.

Several reasons contribute to the fact that so many Madras timbers are not utilized to the extent that they might be; a few are here noted. Firstly, it has not been the custom to season our soft-woods in the way in which they should be seasoned to get the best out of them. Secondly, in Europe there are a multitude of wood industries whilst out here there are practically

none; in Europe, amongst others there are carpentry, joinery, cabinet-work and furniture-making, sculpture and carving, cooperage, wheel-wrightery, turnery, and a vast amount of other quite distinct and separate industries, many of which have now their special machinery to develop their productions in large quantities, with rapidity and with greater accuracy than could be done by hand; in Madras such separate industries are practically non-existent, the local carpenter makes a poor effort to combine them all. Thirdly, whilst in India intense stress has been laid on durability of timber, and practically on durability alone, in probably three quarters of those industries in Europe durability is of little or no account. Fourthly, many of our best timbers are too hard, and often far too large, to fell with the implements in vogue, they are located in inaccessible places with a lack of communications, in exceedingly dense forests whence it is impossible to extract isolated trees, which is at present the ordinary mode of sale transactions; to undertake extraction on commercial lines, costly apparatus is required, costly lines of communication must be opened, and the whole business must be conducted on a scale that has not hitherto been attempted in the Presidency.

In Europe the number of species is small; taken as a whole, the intrinsic value of each species is poor, but the quantities are very great, and their very abundance makes them commercially valuable. In Madras the number of species is very large; each species, however, is seldom abundant throughout the Presidency, although it may be abundant in a few localities; but seldom to compare with the abundance of European species. Although, therefore, taken as a whole, the majority of our species are intrinsically considerably superior, their want of abundance—according to their present mode of treatment—vitiates their commercial utility.

MADRAS ... COLLEGE
1910
G. Lil
M4c

On the other hand, there are numerous Madras species which are practically identical as far as their wood is concerned, nearly the same in hardness, weight, colouring, transverse strength, size of pores and medullary rays, and so forth; and the object of this work is, then, to club these species together into a single commercial category. By doing so, a double object is secured; (1) a great reduction in the confusion of nomenclature, 812 species are brought into 64 categories and seven sub-categories; (2) the classification of several species as the same wood increases the abundance of that wood, and thereby its commercial utility and value. This procedure is not novel; it will be seen that in the Philippines several different species are sold as the same wood, such species not always being even of the same genus; the same is done with Japanese commercial wood.

In this pamphlet, a brief description of the European (French) woods and their uses has been given. It will be seen that the quality of the European species is very diverse; the spruce grown in low situations is soft spongy and very inferior, that grown on the mountains is very homogeneous, compact and excellent, commanding very high prices, but all classes are sold as spruce; the sapwood of the Scotch Fir (otherwise called Riga Pine or Red Deal) is distinctly bad wood, it frequently comprises the whole tree, and the bulk of the material in the market is of this quality, the well-grown heartwood on the other hand furnishes some of the best mast-wood in the world, and yet all classes are sold as Red Deal (Scotch fir or riga pine); similarly, oak grown in High Forest is totally different in qualities to that grown in open coppice, but all is sold as oak. Now, if we examine the woods of each of the categories herein given, we find that there is not nearly as much difference in hardness, weight, colouring, transverse strength, durability, structure, and so forth, as in the

European species above referred to; and, to all intents and purposes, they are one commercial species. It is possible that the clubbing together may go farther than has been here given; the larger the amount of clubbing, the greater the abundance of the clubbed species and in consequence the greater their commercial value on the one hand, and the simpler becomes the nomenclature and the less the consequent confusion on the other. It is possible, for instance, that, instead of having fifteen categories of soft woods, they might be even further clubbed into one category of "soft woods," pure and simple.

Advantage is being taken of the Exhibition in Madras, now on show, to bring together these woods into their categories as given herein, and to invite full criticism of this classification; a book is kept in the room of the Exhibition for remarks by any person who will be kind enough to interest himself in the matter and to criticize or suggest, and all such criticism will be most thankfully received. What is wanted is a scheme likely to be adopted by the commercial community, and not the empirical opinion of one individual; the arrangement herein given, based on fairly scientific principles of the important qualities of the woods, is intended merely as a help towards such "categorization," and not necessarily as final.

From the knowledge of the characters of European woods and their mode of utilization as given herein, and their comparison with the Madras woods drawn up on precisely the same lines, together with their present mode of utilization, and with the utilization of almost identical woods of the Philippines as extracted from Schneider's pamphlet, it is hoped that our Indian woods may be put to a far larger number of uses than prevails at present, and that proper wood industries, such as exist in Europe, may be developed.

Note on the Structure and Seasoning of Timber.

(Extracted mostly from Schneider's Pamphlet on the Philippine Timbers, and from Sir William Sclich's Manual of Forestry.)

1. Anatomy of wood.—Wood consists of three kinds of elementary organs, which do not, however, all occur in every species of tree namely, *Wood-vessels*, *Wood-fibres*, and *Wood-cells*.

(1) *Wood-vessels* are more or less narrow tubes closed at their ends, which run longitudinally through the stem and branches of trees. Their walls are thin when compared with their (*lumina*) hollow interiors, and the latter appear as *pores* on transverse sections of the wood.

(2) *Wood-fibres* are the chief constituents of wood; they are elongated closed organs, a few millimetres (1 millimetre = 1/25 inch, nearly) long and pointed at both ends; and their walls are more or less thickened, sometimes so much so that their (*lumina*) hollow interiors are greatly contracted. Of these, there are three kinds: (*a*) True wood-fibres, with very thick walls and small pits on them, (*b*) Tracheids, with thinner walls bearing large bordered pits on them and large (*lumina*) hollow interiors, and (*c*) Intermediate Fibres, resembling the first but containing starch and protoplasm.

(3) *Wood-cells,* or soft growing tissue (*Parenchyma*), are more or less thinly walled and nearly isometric cells, usually with flat ends, and superposed one above the other like bricks; they contain starch, at least in the younger wood, for the greater part of the year. They are thus the store-chambers for reserve nutrient material, which may be used in ensuing years for forming leaves, flowers and shoots; whilst wood-vessels and wood-fibres (of the first two kinds) serve to convey air and watery sap throughout the plant.

(4) *Cambium Layer.*—In the young stem (early part of the first year's growth) of most trees other than palms the wood-vessels and wood-fibres from Fibro-vascular bundles of elongated cells leaving no intercellular spaces, and these bundles first appear as a circle of wedge-shaped masses (on transverse section), by which the stem is divided into a central cellular portion called the Pith (*medulla*) and a peripheral Primary Bark (*cortex*), the space between the bundles being occupied by cellular tissue constituting the Pith Rays (*medullary rays*), and uniting the pith with the bark (*cortex*). Each Fibro-vascular bundle increases by the division of certain of its own cells, called *Cambium cells;* whilst certain cells become permanent tissue by thickening of their walls and disappearance of their contents making growth to cease, the Cambium cells remain capable of division and growth proceeds by the Cambium forming new cells on both sides in the inner portion of the Fibro-vascular bundles. After the first year's growth, the cells of the medullary rays, stretching between the Fibro-vascular bundles and continuous with their Cambium cells, becomes converted into a secondary generating tissue (*meristem*), and there an interfascicular Cambium is formed, which eventually coalesces with the Cambium cells of the Fibro-vascular bundles, and thus a complete *Cambium Ring* is formed; and from this Cambium ring new wood (*xylem*) is formed on the inside, whilst new bark (*phloem*) is formed on the outside; and in this way the stem increases in thickness. This might be put in another way :—if the bark be separated from the stem of a tree, there is between the two a layer of slimy mucilaginous matter, and this is the *Cambium Layer*, which is partly formed bark and partly formed wood, and is the seat of all new-forming bark and all new forming Wood.

(5) *Medullary Rays* (or *Pith Rays*) consist, then, of woody cells, which in winter contain starch; they form bands, running radially either from the pith to the bark, or originate from some of the later annual zones and run radially to the bark; that is to say, they are the same tissue as, and the connecting bands between, the pith and the cambium; as the pith becomes too old to perform its functions properly, the cambium of some later year takes its place, so that the connexion between all living tissue shall be kept up. The number and size of these rays have much influence on the technical properties of wood; and the *Silver Grain* is the character given by their radial section, generally in the form of satiny or shining small plates.

(6) *Annual Rings.*—The growth in thickness of the wood internally and of the bark externally from the cambium layer ceases periodically and is renewed with each new period of vegetation, and thus the wood is formed in concentric layers, each being an *annual ring* of wood; and the same is seen in the bark (cortex). The rings of the wood are thus formed successively outside those pre-existing, while in the bark the new layers are produced inside those already formed (but much thinner than those in the wood). If the spring and the summer wood were similarly organized, it would be impossible to distinguish the annual rings on a transverse section of a piece of wood; and, in India, this is by no means infrequently the case, and the annual rings are not distinguishable. In Europe, after the cessation or nearly so of vegetable activity in the winter, that of the spring is exceptionally vigorous, and the vessels are large and numerous, whilst the wood-fibres are wide and thin-walled, gradually diminishing through the summer and autumn wood, so that the contrast between the juxtaposed boundaries of two annual rings becomes very distinct.

(7) *Resin ducts* are spaces without true walls, surrounded by resin-forming cells; they run not only parellel to the axis of the tree, and are then visible on transverse section, but also pass along the medullary rays.

2. CHEMICAL AND PHYSICAL PROPERTIES OF WOOD.—Freshly felled wood is composed of *woody substance, water,* and *other materials,* some of which are dissolved in water.

(1) *Woody skeleton* of trees is the walling of its component organs, and is chiefly composed of cellulose and lignin. In the cambium layer the walls of all elements are of cellulose, but during the very year of their formation the cell-walls become thickened by layers of lignin, which contains more carbon than cellulose. Cellulose is soft, flexible, highly hygroscopic and permeable by fluids; cotton-wool is practically pure cellulose. Lignified woody substance (cell-walls thickened by lignin) is harder, stiffer and less liable to swell by the action of water. Whilst all other ingredients are soluble in caustic alkalies, cellulose is insoluble; and advantage of this fact is taken in the preparation of paper pulp, which in its best state consist solely of cellulose.

(2) *Water* exists in considerable quantity in freshly felled wood, varying from 30 to 53 per cent roughly, 45 per cent of the total weight of the wood; it varies with the species, the season, the part of the tree, the locality and various causes. *Air-dried* wood, such as has been kept for a long time under cover in timber yards, retains only 10 to 11 per cent of that water; *absolutely dry* wood can only be obtained by placing wood in drying chambers at a temperature of 105° centigrade, and it only retains that state of dryness in the drying chamber. Water is absorbed, together with mineral matter (crude sap) by the roots; it is drawn up, by the action of the sun on the leaves, chiefly through the cambium layer and juxtaposed tissue, to the leaves;

there the sap undergoes a chemical change by the respiration of the leaves, and it passes down again to the roots in a continually more and more altered form (elaborated sap), a continuous circulation passing up and down through the living portions of the tree.

(3) *Inorganic and organic materials* comprise chiefly *ash*, *proteins*, *starches*, *tannins* and colouring matters, and resins. (*a*) *Ash*. If wood is burnt in air, by combination with oxygen everything passes off in the form of gases with the exception of the mineral matter taken up by the roots as solution in the sap; these mineral matters which represent the residue after the wood has been burnt, are usually termed the ash, or ash-constituents of the wood; these ash constituents are generally more abundant in the younger than in the older wood, predominate in the cambium, bast (certain fibre layers in the phloem, where the cell-walls are thickened so as to become flexible), and bark generally, and are most abundant in the upper and outer parts of the tree. (*b*) *Proteins* are rich in nitrogen, and are chiefly found in the young unlignified wood, and especially in the cambium; they are amongst the most complicated of organic substances, and amongst the most unstable in consequence, and readily decompose, thereby starting decomposition of other organic matters, and consequently become the chief accelerators of decay and rot in wood. Amongst them are included *protoplasm* and *albumen*. Protoplasm, which lines the interior of the cell-wall, is the essential living portion of the cell, consists of an albuminous substance mixed with water and some incombustible materials and containing some organic compounds, is a soft gelatinous substance with a granular and turbid appearance, is coagulated by heat, soluble in a dilute solution of caustic potash and is coloured yellow or brown in iodine solution (which colours cellulose and starch deep blue); it appears that,

by its joint action with that of the sun, most of the chemical changes including the conversion of starch into *Chlorophyll* (green colouring matter of plants), and vice versa are induced in the sap from its crude to its elaborated form. *Albuminoids* are a group of substances, containing sulphur as well as nitrogen and the carbon, hydrogen and oxygen ingredients, are always amorphous but are capable of existing in two forms (soluble and insoluble), and belong to the group of bodies called *Colloids*, and easily pass from one condition to the other ; they are easily dissolved by caustic potash, and the soluble varieties are coagulated by alcohol and some by heat alone (cf. white of egg), and are precipitated by tannin and salts of copper, lead and mercury. Albuminoid bodies may be kept, when dry, for any length of time, but *when moist they rapidly putrify*, produce a sickening odour, and the readiness with which these bodies change in the moist condition produces the digestive and other ferments in the body, and the ferments—synaptase, diastase and emulsin—which will find in plants. (*c*) *Starches* or *Carbohydrates* are a large class of cognate but distinct compounds of carbon, hydrogen and oxygen, which includes, besides starch, various forms of sugar, gum, mucilage, and various other allied substances ; they are found chiefly in the cambium and the adjoining sapwood and bark. Starch originates within the living vegetable cell through the formative activity of chlorophyll under the influence of light, and is consequently an unfailing characteristic of all plants containing chlorophyll ; starch found within leaves and other green parts of plants is assimilated and transformed with great rapidity ; accumulations of it are carried as starch-formers, and redeposited as starch in special reservoirs or portions of plants as the period of maturity approaches ; it occurs in minute granules which are only slightly acted on by cold water, but under the influence of heat in water it swells up

forming a clouded opalescent paste. Diastaste and dilute acids convert starch into a form soluble in hot water, when it passes into a series of easily soluble dextrins (sugars), and finally into the conditions of the sugars, dextrose and maltose. Diastaste has the power of converting many times its weight of starch into dextrin and dextrose, when made to act on it in the presence of water at about 152 degrees Fahrenheit (i.e., the heat of an ordinary tropical sun for the greater part of the year round, but a temperature seldom attained in Europe, a fact to be noted and remembered). This action is called Chemical Fermentation, that is, a peculiar class of metamorphoses which certain complex organic materials are liable to ; thus starch is liable to ferment into sugar, sugar into alcohol, alcohol into acetic acid, or starch can ferment into citric acid by another process, and various other modes of fermentation (putrefaction and decay, being other examples) may occur. In almost all fermentations of starch and allied matters, the operation gives rise to the generation of various classes of fungi, e.g., Yeast in brewing operations, or what is popularly known as Mildew in most fermentations of starch (as may be observed on a pot of starch paste left under the suitable conditions of *dampness accompanied by high temperature*). Thus, woody tissues richest in starch are most exposed to the attacks of fungi, and also of wood-destroying insects. (d) *Tannins* and colouring matters are closely allied; the former is a class of substances which, though widely differing in chemical constitution, have the common property of precipitating gelatine from solution and forming insoluble compounds with it, a property which is effective in producing leather; they are astringent substances, which give dark blue or green solutions or precipitates with ferric salts, and turn dark, brown in the presence of alkalies, and they are all very soluble in water. They are chiefly found in the bark, but are rarely absent

from the wood of any species of tree. (e) *Resins* embrace various kinds of solid resin or pitch, fluid balsams (such as turpentine), volatile oils, and fixed oils (which are classed as drying oils, fatty oils, and solid oils); and allied to these resins, are Caoutchouc or India-rubber and Gutta-percha found in the milky juices (*latex*) of numerous species, in special laticiferous vessels which occur most abundantly in the phloem layers. Resin increases the hardness and weight (the more so the more solid, and less balsamic it is) of timber, and a certain amount of it increases its elasticity, whilst excess renders it brittle; Scotch Pine, tapped for resin, has inferior wood, because the resin is not naturally in excess but Maritime Pine, tapped for resin which is in excess in the tree, has an improved timber.

(4) *Heartwood and Sapwood.*—The inner and older zones of wood are generally called *Heartwood,* and the outer younger ones *Sapwood*; and, properly speaking, there is an actual change in the tissues. In true heartwood, the walls of the woody elements are changed, and frequently their hollow interiors (lumina) are filled, with colouring matter, resin, gum, or mineral substances, which render the heartwood heavier, and usually darker-coloured and stronger, than sapwood; there is little or no protein or starch in the heartwood, which is therefore less liable to decay and attacks of insects than the sapwood; it has lost all its vital functions, and, though containing a certain amount of water, that is always far less than in the sapwood. The sapwood is fully formed structurally from the cambium, but continues to carry on processes vital to the tree, such as the conveyance of water and reserve nutritive material, and therefore contains more water, and is usually less darkly coloured than the heartwood; but these distinctions do not hold good for many species, nor does the presence of colouring matter in the central part necessarily indicate this physiological change; in

certain cases, the change of colour in the centre indicates not strength but the commencement of decay.

(5) *Specific Gravity, Weight and Density.*—In most scientific works weight is given as specific gravity, that is, the ratio of the weight of a given volume of wood to the weight of an equal volume of water; and the cubic metre (35·3 cubic feet) is usually taken as the standard. To obtain the weight per cubic foot of a timber whose specific gravity is known, it is sufficient to convert the decimals of the specific gravity into whole numbers and divide by 16; thus, if the S.G. is 0·607, the weight per cubic foot = 16)607 = 37·94 lb.; and the converse, to find the S.G. from the known weight, also applies. Great weight is often an objectionable feature, as in the case of transport, in the case of making heavy superstructures involving costlier foundations, etc.; nevertheless it usually serves as a recommendation for wood on account of the fact that most or the other, and more desirable, qualities—such as hardness, strength, toughness, and durability—are intimately related with it; wherefore, it will be seen that our Indian woods, as whole, are vastly superior to European woods, provided that the Indian woods are *properly treated.* The varying weights of different woods, when dry, do not depend on the quality of the wood substance itself, but on the relative thickness of the cell-walls and the size of the cell-cavities and pores; light woods float only because of the relatively large amount of air contained in the various wood elements.

(6) *Strength, Stiffness, Toughness, Elasticity, Pliability, Hardness*—(*a*) *Strength of Wood.*—Cross-bending.—One of the most conspicuous and valuable properties of wood is that of resistance to breaking when subjected to a bending strain, as is a beam when supported at the ends and itself supporting a load. It is this property which fits wood to be used in construction in the form of long

beams, where stone cannot be used on account of its brittleness, nor steel on account of its great weight and cost. The strength of a beam is directly proportional to its breadth—that is, length and depth being equal, a beam twice as wide as another is twice as strong. It is directly proportional to the square of the depth, that is, a beam twice as deep as another is four times as strong. It is inversely proportional to the length (or span between the supports), a beam twice as long as another being half as strong. In tests made by Engineers, the breaking strength of beams is expressed by a fixed formula from the dimensions of the beam (span, depth and width) and the breaking load:—

$$\text{P (Co-efficient of Transverse Strength)} = \frac{\text{W (lb.)} \times 1 \text{ (feet between supports)}}{\text{b (inches)} \times \text{d}^2 \text{ (inches)}}.$$

Crushing parallel to grain.—This is the stress to which wood is subject in pillars, struts, etc: For very short thick pieces with the load or pressure acting squarely on the ends, the resulting strains are very simple and act equally on every unit of area in the cross-section of the piece. In such cases, the resistance of the wood to crushing is very closely related to hardness. If loaded to the breaking point, the fibres ultimately yield by buckling clear across the area of the cross-section or by splitting in one or more nearly longitudinal plains. In the case of long columns, the piece yields as a whole in the direction of its least stiffness, becoming concave on one side and convex on the other, and finally fails in much the same way as a beam under a transverse strain. In such cases, the ultimate strength of a column depends more on the stiffness and toughness of the wood than on its hardness. Crushing across the grain.—When a block of wood is compressed between two surfaces of equal area to, or larger than, its own, the grain being parallel to the crushing surfaces, the

stress to which it is subjected is simple crushing, and the resistance of the wood to it will be very closely related to its hardness. In practice, it is much more common to find a condition where the pressure acts only on part of the surface of the wood, as where a rail rests on a tie (sleeper), or the foot of a post on a horizontal structural part. In such cases, part of the pressure exerted goes to compress the area immediately subject to pressure and part to overcome the resistance to bending and shearing of the fibres adjacent to the edges of the area of compression. In addition to hardness, the toughness and stiffness of the wood also influence the results in such a case. Over large areas and for small degrees of compression (about 0·1 inch), the resistance to compression is generally considerably greater than that to shearing and bending along the edge. On small areas, or when the load is sufficient to cause deeper compression, the shearing strain often becomes much more important than the compressive strain. Shear along the grain.—Shearing along the grain takes place when a tenon forces out the material at the edge of a mortise situated close to the end of a piece, also when a loaded beam bends and, owing to compression at the top and tension at the bottom, splits horizontally. Conifers (Pines, Firs, Spruce, etc.), owing to their homogeneous structure and straight grain, shear off more easily than broad-leaf species, and there is little difference between radial and tangential planes in resistence to shearing. The hardwoods, as a rule, shear with more difficulty in the tangential plane. In the case of species having a pronounced alternating spiral- or cross- grain, the condition is reversed, such wood, shearing more easily in the tangential plane, that is, parallel to the growth rings. These statements apply to wood in general, but it is possible that in one respect they may have to be modified when a greater number of tropical woods have been

studied and tested. As has been mentioned before, cross- and spiral- grain seems to be more common and more pronounced in Tropical than in Northern woods. This so much affects the shearing and splitting strength that it is quite probable that the average tropical wood will shear and split fully as easily, and even more easily, in a tangential than in a radial plane. Splitting tests made by R. S. Troup, Indian Forest Service, in 1909, point strongly in this way. He says that of 61 woods tested, the splitting was easier along the tangential plane in 43 woods, and easier along the radial plane in 11 woods, while in the remaining 7 woods the splitting force was identical in each plane; and that, if we take the average splitting force for all the 61 woods, we find it to be 7·79 for radial and 2·92 for tangential splitting. It should be remarked that the woods tested by Mr. Troup were of a character altogether similar to that of Philippine woods, about a dozen being identical with, and the majority of the rest closely related to, Philippine species. Shear across grain.—Shearing across the grain takes place when two pieces joined by a wooden pin slide over each other, thus cutting off the pin. The handle of an axe or hammer where it enters the eye, tenons where they enter the motise, and similar parts, are subject to shearing strains, but in these there are generally present also bending and twisting strains. Shear across the grain is so closely dependent on hardness, resistance to transverse compression and toughness, that the fitness of a wood to resist transverse shearing can be closely judged from these qualities. Tensile strength.—The tensile strength of wood along the grain is very great; in Yellow pine it is about 17,000 lb. per square inch, a little greater than that of cast-iron and about 1/5 that of high grade Bessemer steel; but steel weighs about twelve times as much as this wood, so that, weight for weight, Yellow pine has more than twice the tensile

strength of steel. In actual construction, wood is hardly ever torn in two by a longitudinal pull, for the fastenings at the end of a timber almost invariably pull out through shearing or splitting long before the tension is sufficient to overcome the tensile strength of the piece as a whole. Across the grain the tensible strength of wood is very low. It is this fact which causes cross-grain and knots to constitute a very serious source of weakness in large timber. Especially is this the case when such defects exist in the lower half of a horizontal beam, which is in tension when the beam is loaded.

(*b*) *Stiffness.*—Next to strength, stiffness is the most valuable property in a beam. Stiffness is directly proportional to the breadth of the beam--that is, a beam twice as broad as another is twice as stiff. It is proportional to the cube of the depth a beam twice as deep as another is eight times as stiff. It is inversely proportional to the cube of the span—a beam twice as long as another is only ⅛ as stiff. Stiffness is closely related to elasticity, inasmuch as it is constant and measurable only within the limit of elasticity. The relative stiffness of woods as determined by tests is therefore indicated by the "Modulus of Elasticity," a figure calculated from the dimensions of the beam under test and the load and deflection at the elasticity limit.

(*c*) *Toughness and Flexibility.*--Toughness is a valuable quality easily recognized in working and using woods, but difficult to define and measure exactly. The word "tough" is often applied to woods that are difficult to split; but the terms are not at all synonymous, as a tough but perfectly straight grained wood may be easier to split than a hard brittle and cross-grained one. A brittle wood is one that breaks more or less suddenly and completely soon after deformation beyond the elastic limit, so a tough wood may perhaps be best described as one that resists complete rupture under

deformation considerably beyond this point. Accordingly, it is measured in one way as the "work to maximum load," a figure calculated from the point of complete failure of beams in bending tests, expressed in pounds per cubic inch. Another measure of toughness is the resistance to breaking under repeated blows of a hammer which is dropped on a beam from increasing heights; the relative "resistance to impact" is expressed as the height in inches through which a hammer of a given weight must drop to cause complete failure or a certain permanent deflection ("set") of the piece. Probably the best measure of toughness is derived from Torsion (or Twisting) tests. For torsion tests, a cylindrical specimen with square ends is held in a lathe-like machine, of which the head-stock revolves, the stationary tail-stock containing apparatus for measuring the force exerted to produce complete rupture. Torsion involves transverse and longitudinal shear, transverse compression, and longitudinal tension of the fibres; it therefore is more representative of the complex stresses occurring in actual practice than are the other tests designed to measure each one of these separately. Taking into account the facts that all woods are most plastic (pliable) when green, and stiffest when dry, that the quality of toughness is therefore best demonstrated when the wood is dry, and that toughness is the ability to be deformed without rupture when loaded beyond the elastic limit, the best indication of this quality that can be derived from tables is by observing the relative difference between "Modulus of Rupture" and "Modulus of Elasticity" where moisture is under 20 per cent. That is, a wood having a high factor of stiffness (Modulus of Elasticity) and a low factor of strength (Modulus of Rupture) will, broadly speaking, be less tough than one with a relatively lower factor of stiffness and a higher factor of strength.

(*d*) *Resilience and Elasticity*; *Plasticity or Pliability.*—Resilience or Elasticity is the power of a body, when deformed by any stress, of returning to its former shape when released. No substance is perfectly elastic, but many are practically so up to a certain point, which is called the "Elastic Limit." Up to this limit, equal increases of load will produce equal increases of deformation, but the body will return to its original form when the load is removed; beyond this limit, an additional unit of load will cause more than the proportionate increase of deformation, and the body, when the load is removed, will not return completely to its original form. In very hard, brittle, and almost perfectly elastic substances, such as glass, the limit of elasticity almost coincides with the maximum strength, that is, a glass rod, when bent a very little beyond the elastic limit, snaps off. In flexible tough substances, such as rattan, the elastic limit is low, and the breaking limit is very high. No wood is as brittle as glass, though some, within small limits, are equally elastic, and few or none are as tough and flexible as rattan. A given wood may be very hard and tough, and yet not elastic and "springy". A thin piece of heritiera, for instance, which is very hard and tough, and heavier than any American wood, can be bent almost like sole-leather, but like leather, it stays bent instead of springing back to its original form. Plasticity, or pliability, is the opposite of stiffness and of elasticity or resilience. All woods are more or less plastic when deformed beyond the elastic limit—that is, they acquire a permanent set when loaded beyond this point. Heat and moisture increase plasticity greatly. For this reason, steaming and boiling are employed in the manufacture of bent-wood furniture, carriage-shafts, felloes, boat-ribs, pressed imitations of carving, etc. Plasticity is not the exact opposite of hardness, but hard woods are, as a rule, less plastic than

soft ones, for the greater amount of material per unit of volume naturally resists deformation, whether by bending, stretching, or compression, more than does the dense material of softer woods. *Fissibility* is the property which a wood possesses of being split by a wedge driven into it in the direction of the fibres. It is clearly a form of hardness, but it is chiefly affected by the structure of the wood in question in that it demands long straight fibres to render a wood fissile, and by the elasticity of the fibres in that the more elastic a wood the faster the splitting precedes the wedge; at the same time it must be remembered that elasticity of fibres also varies with their length and straightness. A wavy or twisted condition of, or lack of homogeneity in, the fibres implied considerable power of resisting fission; and, as already explained (see (*a*) *Strength of wood*—Shear along the grain), a very large proportion of tropical woods have a cross or spiral-grain in a far more pronounced degree than in European or Northern woods; consequently fissibility is a quality that but few Indian woods possess, whilst in Europe all are more or less fissile, some very easy to split, some easy to split and only a few difficult to split.

(*e*) *Hardness* is a property that is recognized and roughly compared even more readily than toughness, but equally difficult to measure. It has been defined as a resistance to indentation and abrasion or scratching. The wood-worker defines it as resistance to penetration by tools, which really means either, or both, indentation or scratching, as well as cutting, according to the tool used. Hardness tests have been made by abrasion with sand-paper or sand-blasts, by indentation with tools of different forms, and by scratching. The test used by the United States Forest Service consists in measuring the load necessary to imbed a steel ball (o. 444 inch in diameter) in the surface of the wood to half its diameter, trials being made on end grain and on radial and tan-

genital sections, the average of these being considered the measure of hardness. The Continental method is that of a square die.

Gardner used the following method:--Representative samples of the various species, were selected, seasoned, and one surface of each carefully smoothed. Across the grain of each smoothed surface a hardened steel point was drawn, with a pressure of 3·3 lb. The depth of the scratch produced was considered a measure of hardness. On such woods as Ebony and Mimusops elengi the steel point had very little effect, while on California Redwood and Red Cedar (Cedrela) it made a ragged scratch 1·32 inch or more in depth. The first are placed in the scale of hardness as very hard, and the two latter as very soft. Roughly, in practice, soft and very soft woods can be impressed with a finger-nail, and comparative greater hardness can be tested with a knife-blade.

(*f*) *Effects of moisture on mechanical properties.*—All mechanical properties are strongly influenced by the greater or less moisture content of the wood. In fact, it influences the strength of timber more than does any other structural peculiarity, excepting only decided imperfections, such as large or numerous cracks, bad knots, etc. That the presence of moisture in wood will increase its weight is self-evident. That wet wood is softer, more flexible, and less resilient than dry wood is a matter of common observation. Besides this, mechanical tests show that wet wood is weaker in bending, crushing and shearing tests (quite wet or quite dry wood is more fissile than partially dried wood); only in Tersion tests is the strength very little affected by the moisture content. All of these statements refer to the natural water content of the wood. Air-dry wood may re-absorb moisture from the atmosphere, or may even be soaked until it contains as much water as in the green condition without becoming weaker than when it was

green. Kiln-dry wood on the other hand, and wood which has been steamed, on being resoaked, will become even weaker than the natural green condition. The higher the temperature at which it has been dried, or the greater the steam pressure to which it has been subjected, the more serious is this effect. Where strength is of more importance than freedom from shrinking, as in structural timbers, wood should therefore be kiln-dried only to a point where the moisture content will correspond to that of the thoroughly air-dry condition, nor should it be subjected to steam at high pressure.

3. SEASONING.—The operation of seasoning comprises two phases:—(1) the speedy elimination, as far as practicable, of the Proteins and Carbohydrates; and (2) the drying of the moisture content of the timber.

(1) *Elimination of the Fermentible material.*—(*a*) "*Bluing.*"—The former of these two operations has not been sufficiently recognized in this country. Whereas in Europe, owing to the normal low temperatures of the atmosphere, fermentation sets in extremely slowly, in Tropical climates on the contrary it sets in very rapidly. Experiments recently have shown that in the course of a very few days, 2 to 5 ordinarily, in a tree felled and left lying unbarked the timber will have "blued," that is, fermentation and mildew will have set in. As a common occurrence, a pot of starch paste will, on a steamy tropical night, have become covered with mould or mildew, which, in Europe, might be kept for weeks with a mere hardening of the top and without the formation of any fungus on it. When mildew has set in, it is proof positive that fermentation has begun, and fermentation means the decay and disorganization of all the organic products in that material. Mould or mildew is usually a greenish-blue fungus, and it discolours wood; a clear white, creamy-white, pale yellow or pale flesh-pink tinted wood will by "bluing," become a dirty grey

or brown, a colouration which invariably detracts from the value of the wood. From what has been said about heartwood and sapwood, it will be understood that such deterioration is more pronounced in soft-woods and in trees that have no true heartwood. But not only is it a matter of discolouration by ordinary mildew, fungus and decay has already started both in the free starch and in the lignin of the formed tissues. It has been shown in paragraph 2 (3)—that the most unstable of the organic matters are the Proteins or Albuminoids, and that whilst moist they are both extremely rapid in disintegrating and give rise to ferments; these ferments under the action of moisture and heat cause the disintegration not only of the starches but also of the carbohydrate lignin of the thickened cell walls, where, it is a recognized fact, the fungus of decay occurs. Trees felled and left with their bark on, have their cambium layer enclosed so that no breezes can get to it, either to dry it up or to cool it and prevent fermentation. This cambium layer is at once the chief site of the Proteins and Starches, and of the chief moisture stratum in the tree; whence there is everything in favour of fermentation and decay rapidly setting in.

(*b*) *Barking and Squaring.*—The very first thing that should be done, then, immediately a tree has been felled, is to bark it. In some cases this is done—mostly, however, in connection with the better and harder species only, whilst it is more essential with the softer and inferior species—in the operation of "squaring" the timber. This is a most useful procedure if done at once after felling, as it removes not only the bark but also the sapwood, which contains the most moisture and the greatest abundance of fermentible matter in the tree; whilst it is very seldom that the sapwood is of a quality approaching that of the heartwood. In the case of soft-woods and these having no true heartwood, however, this is both insufficient and wasteful. The logs

should at once be soaked in water after felling and barking. In many places this is done in the event of logs being floated from the forest to the site where they are to be worked up; but, even then, the logs are often left out of the water for months until the rains produce sufficient water to float them down to their destination.

(*c*) *Tredgold on water-seasoning.*—Tredgold (1840) says :—"322. Water-seasoning. On account of the time required to season timber in the natural way, various methods have been tried to effect the same purpose in a shorter time. Perhaps the best is to immerse the timber in water as soon as it is cut down; and after it has remained in water a fortnight, but not more, to take it out and dry it in an airy situation. Evelyn directs, to lay your boards for a fortnight in water (if running water the better, as at a mill-pond head), and then setting them upright in the sun and wind, so as it may pass freely through them, turning them daily; and thus treated, even newly-sawn boards will floor far better than these of many years dry-seasoning, as they call it; and he adds, I thus often insist on this water-seasoning, not only as a remedy againt the worm, but for its efficacy against warping and distortions of timber, whether used within or exposed to the air. Duhamel, who made many experiments on this important subject, states that timber for the joiner's use is best put in water for some time, and afterwards dried; as it renders the timber less liable to warp and crack in drying; but he adds, where strength is required it ought not to be put in water. And he found, from numerous experiments, the timber which remained some time in fresh water lost more of its weight in drying than that which was dried under cover; and he observed that green timber that had been steeped in water for some time was always covered with a gelatinous substance. Timber that has been cut when the timber was full of

sap, and particularly when that sap is of a saccharine nature, must be materially benefitted by steeping in water, because it will undoubtedly remove the greater part of the fermentible matter. Duhamel has ascertained that the sapweed of Oak is materially improved by it, being much less subject to worm-eat; and also that tender woods, such as Alder and the like, are less subject to the worm when water-seasoned. Beech is said to be benefitted by immersion; and green Elm, says Evelyn, if plunged four or five days in water (especially salt water) obtains an admirable seasoning. When timber is put in water it must be sunk so as to be completely under water as nothing is more destructive than partial submersion. Salt water is considered best for ship timber, but for timber to be employed in the construction of dwelling houses fresh water is better.

323. *Of steaming and boiling timber.*—Though steaming or boiling impairs the strength and elasticity of timber, it gives another property, which for some purposes is still more desirable than stength; for boiled or steamed timber shrinks less and stands better than that which is naturally seasoned. Therefore it may often be useful to season timber in this manner when joiner's work is to be executed in Oak of British growth, as without this precaution it requires a long time to season it so as to be fit for such purposes. The timber should not remain long in boiling water or steam; four hours will in general be quite sufficient; and after boiling or steaming the drying goes on very rapidly; but it is well not to hasten the drying too much. Steamed wood dries sooner than that which is boiled, according to Mr. Hookey's experiments. How far steaming or boiling affects the durability of timber has not been satisfactorily ascertained; but it is said that the planks of a ship, near the bows, which are bent by steaming, have never been observed to be affected with the dry-rot. The changes produced by

boiling, as observed by Duhamel, are not vey favourable to the opinion that it adds to the durability of timber. For when a piece of dry wood was immersed in boiling water, and afterwards dried in a stove, it not only lost the water it had imbibed, but also part of its substance; and when the experiment was repeated with the same piece of wood, it lost more of its substance the second time than it did the first. The same thing takes place in green wood; and tender woods, or those of middling quality, are more altered by these operations than hard woods, or those of good quality. Dr. Watson found long steeping in cold water produced similar effects; but that Box, Oak and Ash lost more weight by this process than Mahogany, Walnut and Deal. Both cold and hot water has therefore to a certain extent the power of dissolving the woody fibre."

(*d*) *Elimination of lignin where great strength is of less importance than close-fitting.*—It will thus be seen that even in 1840 the idea of water-seasoning was recommended by the greatest engineer of the age. It is shown that soaking in water takes out the saccharine matter, which is only slowly formentible in Europe but very quickly so in the Tropics. It is shown that, after soaking for some time, the green timber becomes covered with gelatinous matter,—precisely the same occurs in India in a few days time,—which is apparently the oozing out of the undissolved starch, a state in which it is so easily capable of fermentation. The Proteins and Tannins are soluble in water, and these promoters of fermentation are at once eliminated. It is said that long soaking (or steaming) has the power of dissolving in part the woody fibre; this is the lignin part of the fibre, and not the cellulose; and the lignin part is—as Cross, Bevan and Sindall, in "Weed-pulp and its uses", show—the part that "is greedy of Oxygen, and liable to decomposition", and therefore liable to the fungus of decay; as

the process largely gets rid of shrinkage and warping, it seems evident that soaking eleminates a lot of hygroscopic element; so that the loss of lignification though it may somewhat impair strength in structural timbers cannot fail to be a useful process in all timber that is wanted for purposes other than construction. It is just for such non-structural purposes that by far the bulk of the soft-woods, and those of lesser strength, are suited and required; and this is a point habitually ignored in this country. Joiner's work in this country is notoriously bad for its warping; and this is largely because no attempts are made to eliminate before use the hygroscopic carbohyd-rates and proteins. The bulk of the soft-woods are required for such purposes as planking and packing-cases, that is, where the greatest elements of strength are *not* required, but where close-fitting is of importance; and the hygroscopic elements, here too, should be eliminated by soaking or steaming.

(*e*) *Period of soaking.*—It will be noticed that Tredgold gives a fortnight as a maximum period for soaking in cold water; but that must depend very largely on circum-stances, and especially on the dimensions and nature of the piece to be soaked. Some of the huge pieces, that are obtained in this country—e.g., logs of six or eight feet diameter of Bombax, which have no heartwood, must obviously require much more soaking than the planking referred to by Evelyn. Schneider says:—" Practically all lumbermen are agreed that, with the exception of slight loss of weight, there is no advantage in long seasoning in the log. The slight amount of drying that takes place in no way compensate for the severe surface checking, splitting of ends, and damage done by insects and fungi. This refers, of course, to logs lying in the forest, or piled in the mill-yard. With logs rafted to their destination, or dumped in a log-pond, and left in water ready to be sawn, the case is different. Logs

wholly, or almost wholly, submerged in water suffer on damage from insects, and little or none from rot, while all manufacturers are agreed that they saw more easily, and that lumber sawn from them seasons more evenly and, it is claimed by many, even more rapidly. The more quickly logs are taken from the stump to the water, and the less time passes after their being taken from the water and before sawing, the less the logs will deteriorate. Timbers known to stain badly in fresh water or salt, and those known to be easily attacked by teredo in log-ponds, should, of course, remain in the water as short a time as possible."

(*f*) *Brandis, Beddome, and other authors.*—A reference to both Brandis' "Flora of North-West India," and Beddome's "Flora sylvatica" will show that both those authorities recommended water-seasoning, especially in respect of species that are liable to attack of insects. For instance, under *Pongamia glabra* Beddome says:—"It is improved in strength and colour by being seasoned in water"; and Brandis under *Terminalia belerica* says:—"Used for planking packing-cases, canoes, and in the North-West Provinces, for house-building after being steeped in water". Innumerable other references could be made, but these are two of, perhaps, the most despised timbers in the Presidency. Finally, in connexion with Quercus Ilex Mathieu says:—"The wood of the Holm Oak is subject to bad warping and cracking whilst drying, but it is stated that this defect can be avoided by first leaving it soaking under water for some time." It is evident that water-seasoning is highly recommended by the highest authorities, in both Europe and in India; and in former days it seems to have been far more resorted to in this Presidency than latterly, where it is now practically ignored as a process in itself, and is only in vogue where timbers are floated and as part of that operation.

(*g*) *Expedited Conversion.*—The sooner soft-woods can be sawn up into scantlings and planks the better; and to be of any use, they must either be swan up green, or kept submerged in water, and, if the latter, not for too long a period. In this connexion, the following remarks of Gamble, under different species, should be noted:—*Bombax:* "If allowed to dry in the log, the wood gets discoloured, so that, to ensure white planking, the tree should be sawn up at once, and the planks dried separately"; *Butea:* "If cut up green and seasoned in the plank, it is likely to be a fair wood for rough boxes, but cut logs, if left long, get the wood badly discoloured and liable to speedy decay"; *Hymenodictyon:* "Wood white if cut up fresh, if cut up dry brownish-grey, soft. The wood is soft, but of good quality for purposes for which soft-wood is useful. It would do for tea-boxes, etc."; *Alstonia:* "Wood white soft even-grained, seasons badly and soon gets discoloured and mouldy if allowed to season in log"; *Trewia:* "The wood is a good one for purposes for which a soft-wood is required, but, like most of the soft white woods, it has to be cut up when green and seasoned in dry air if it is to retain its white colour, and not get discoloured of a muddy grey."

The principle is practically similar to that which involves the imperative necessity for barking logs immediately after the timber is felled; shut up in the interior of a log, the heated sap—to which no breeze can get to cool it down or dry it up—ferments, and mildew, discolouration and rot set in. The more the log can be opened out, and the smaller the scantlings are, the better the chance of getting at the fermentible matters before they can ferment, whether for soaking out or for drying up. The fermentation can be stopped by rapid drying up of the moisture; but, if not soaked, the material still contains the hygroscopic fermentible matter, and, though it does not follow that it will occur, there is always the

chance that it may absorb moisture again, and restart fermentation; and, in this connection, what has been said about dried Proteins—paragraph 2 (3) (*b*)—should be noted.

(2) *Drying.*—(*a*) *Girdling* consists in making a deep circular cut through the bark and sapwood into the heartwood of a tree, so as to completely sever the connection between the bark and the sapwood above and below the cut. It is generally made from near the ground-level to about a foot above it, and the whole of the bark and most of the sapwood is cut off between the limits. The object is the interruption of the flow of sap; as explained in paragraph 2 (2), the crude sap is drawn up through the cambium layer and juxtaposed tissue from the roots to the leaves, and, after elaboration in the leaves, passes down through channels, more remote from the cambium, in the wood and bark to the roots; the upward supply from the roots being cut off by the tree being girdled,—subject to the exceptions noted below—the leaves can only draw up the crude sap that *remains* in the tree above the cut, and to pass it down elaborated to the roots, and do so until the supply of moisture is completely exhausted; and the girdled tree dies usually after a few days, if the operation has been completely performed. But if even the smallest band of sapwood is left, connecting the outer layers of wood above and below the girdle, the tree is not killed, and often recovers completely, one side of the trunk being clothed again with fresh bark. When a tree is girdled, the loss of water is very rapid at first, as the leaves continue to draw the moisture from the trunk, and to evaporate it until they die and fall off. The girdled tree is allowed to stand one or two years, and often longer if a large tree, and being exposed to the wind and sun, it seasons more rapidly and more completely, on account of the perfectly natural circulation, than a tree that has been felled green. Not only is there

a complete drawing off of the moisture, but partly formed wood becomes completely formed in the process, whilst no further partial wood-formation can continue on account of the cutting off of the flow of crude sap; thus crude material and fermentible products are reduced to a minimum. Most trees with a distinctly marked heartwood may be killed by girdling; but the effect is very slow in some cases, and totally wanting in others, where the trees have no distinct heartwood, such as Adina Hymenodictyon, the Figs, etc. In some species, notably Dalbergia paniculata, Niebuhria (and other Capers), Avicennia, a large number of Climbers, etc., the wood is in concentric belts separated by belts of bast (bark), sometimes with bast bands also dividing the wood proper into wedges; in this case, girdling is of no conceivable use, as the connection between the wood and bast—which ordinary girdling operations sever—is still maintained within the wood itself. To a certain extent, the same effect, as by girdling, is obtained by leaving trees intact after felling (instead of trimming them of their branches and leaves at once), for such period as the leaves remain green on them. In America, by this method the proportion of "sinkers" amongst floated logs was very much decreased.

(*b*) *Loss of water immediately after girdling or felling.*—Wood begins to lose water immediately after the tree is felled or girdled. The first to evaporate is the free water contained in the cells and pores, which is by far the largest part. When this is gone, the water that saturates the cell-walls begins to evaporate. Tests of thoroughly air-dry timber, both in America and in the Philippines (and in Europe), show that it still contains from 7 to 15 per cent, the average being 11 to 12 per cent. If air-dry timber is heated in an oven to the boiling point of water and weighed daily, until no further loss of weight is observed, it is called "oven-dry"; this is the

condition aimed at in scientific tests and on which are based the values of the specific weights of "dry wood" obtained from such tests; but, speaking absolutely, there is no such thing as dry wood, for, if heated above the boiling point, more moisture is gradually given off, and finally chemical destruction begins before all the water is driven out. If, then, "oven-dry" wood is exposed to the air, it re-absorbs a certain amount of moisture, but not quite as much as it contained in the air-dry state. Experiments made by the United States Forest Service show that the "fibre-saturation point", that is, the point at which the free water in the cell-cavities and pores is completely evaporated, and the evaporation of the water saturating the cell-walls begins, corresponds to a moisture content ranging in various woods from 22·5 to 31 per cent; also that shrinkage begins at this point, no appreciable amount of shrinkage taking place in most woods during the evaporation of water in the cell-cavities. The rapidity of evaporation is influenced by many factors, some inherent in the structural peculiarities of different woods, some due to various methods of treatment. As a rule, light soft woods dry out more rapidly than dense hard ones. Water evaporates twice as fast from a radial section ("rift" or "quartered" face) and four times as fast from a cross section as from a tangential section ("flat" or "slash" face). Thin boards dry out rapidly and completely, soon reaching a stage of equilibrium, after which the only changes are slight amounts of absorption or evaporation that take place in consequence of changes in the surrounding atmosphere. In large timbers, many months or even years are required to evaporate moisture from the interior. After thirty years an Ebony log was sawn up and even then practically every piece of board sawn checked and warped more or less. Roth states that a 1-inch board dries more than four times as fast as a

4-inch plank and more than twenty times as fast as a 10-inch timber. Squares in which the rings run diagonally season more evenly, though they generally shrink to a diamond shape; squares cut with rings parallel to two sides are deformed less, but are more liable to check on the two tangential faces. This is due, of course, to the fact abovementioned that shrinkage is greater in the tangential than in the radial direction; the diagonal grain squares have all four surfaces of the same character, midway between radial and tangential, so that both evaporation and shrinkage take place evenly on all of them.

(*c*) *Shrinkage.*—When the process of drying reaches the "fibre-saturation point," shrinkage begins. If wood were a homegeneous substance, this would affect only its size and not its form. A pressed brick, made of well-ground and evenly tempered clay, shrinks equally in all directions without any distortion. Wood not only shrinks to varying extents in different directions, but shrinkage may be, and generally is, irregular even in any one direction. Lengthwise, wood shrinks only about 0·1 per cent, but across the grain from 2 to 14 per cent. Moreover, the transverse shrinkage is about two times as great tangentially (along the rings) as radially (across the rings). This difference is due, at least in great part, to the fact that in this direction the pith rays act like thousands of little struts that resist being compressed longitudinally. Sapwood and young wood generally shrink more than old heartwood. Add to these, irregularities caused by crossed and curly grain, by alternate hard and soft rings, and by the regional disturbances by knots and other interruptions of the normal straight course of the fibres, and it is easy to see that the probability of a given piece of timber warping is at least as great as that of its drying straight. The amount of shrinkage varies greatly in different woods.

Tests of about 35 woods made by the United States Forest Service show the following maxima and minima of shrinkage from the green to the oven-dry condition :—Radial, maximum 8·5 per cent, minimum 2·1 per cent; Tangential, maximum 14·2 per cent, minimum 4·9 per cent; Volume, maximum 21·2 per cent; minimum 7·1 per cent. A fresh-sawn 1-inch plank of Guijo (practically identical with Sal—Shorea robusta—and a wood comparable to the Oaks in weight and hardness) was exactly 48 inches wide in February 1911, exposed to the air under an open shed it shrunk to a little over 45 inches by August 1911; during the first month the shrinkage was over 1 inch, after that it shrunk so slowly that sometimes scarcely any difference for weeks; during the dry hot spring of 1912 it went down to exactly 45 inches, a total shrinkage in width of 6¼ per cent; afterwards it re-absorbed moisture and in February 1913 it measured 45⅛ inches. It is a common but erroneous belief that all soft woods shrink more than do harder ones. The impression is probably due to the fact that they dry out and shrink more rapidly, so that the shrinkage is more easily noticed, and also to their being often used very green for cheap and temporary work, while the harder woods are generally at least partly seasoned and so do not open up so much after finishing. From the excess of tangential over radial shrinkage, a round log developes wedge-shaped radial splits with the largest part of the crack on the circumference; and for the same cause, the boards on either side of the heart of a log tend to warp outward more and more towards the tangent to the circumference. When a fresh-cut timber is exposed to the air or to artificial heat, water naturally evaporates first from the surface. A thin outer layer may be almost perfectly dry while the interior remains nearly green. This outer shell cannot, of course, shrink except within its

own thickness, for to contract as a whole it would have to compress the wet core. So, being partly dry, it hardens or "sets" in the form and size determined by its own shrinkage and by the size of the core. This is called "ease-hardening." Generally the shell cracks more or less deeply from the surface inward. Straight-grained woods that split easily check deep and wide in a few places. Cross-grained woods become covered with a network of fine "superficial season checks." When the interior of the piece begins to dry out, it shrinks in its turn and tries to pull the shell with it. If the wood is one of loose structure, that does not become very hard or stiff in drying, the shell follows the core, and the season checks close sometimes so completely as to show only as fine lines. Since the four corners of the shell are stiffer than the flat sides, they shrink less than the faces and these become more or less hollow. If, however, the wood is one that sets very hard and stiff, the shell refuses to follow the case and the latter, trying to shrink and restrained by the shell, has to split internally. This is known as "internal checking" or "honeycombing." It occurs most easily in woods having large pith rays, like the Oaks, and in dimension timbers. It is likely to be worse in flat sawn than in quarter-sawn boards; in the former the pith rays, running at right angles to the flat boards, prevent these from following the core, while in the latter they present no obstruction to shrinking through the thickness of the board. But severe honeycombing sometimes takes place in quarter-sawn Oak. The more rapid the process of drying is in the beginning, the more pronounced is the case-hardening. It is worst when fresh-sawn wood is exposed to the sun, or placed in a steam or fire-heated dry-air kiln. It is on this account that most of the earlier attempts to kiln-dry refractory woods were unsuccessful. In kilns where moist hot or steam is admitted, case-hardening is largely or

entirely prevented. Most woods dried in the air, but not exposed to the sun, will not case-harden enough to do any harm; but if a large timber is dried, even slowly, and then sawn in boards, the outer boards will warp on account of the fresh soft surface so exposed to shrinking more than the old hard one. This often happens even in two inch or thinner boards that are resawn after partial or complete seasoning. A certain amount of case-hardening, though very little, probably takes place under almost any circumstances. To this it is due that even seasoned boards, if resurfaced, again shrink a little. The hardened outer surface being removed, the fresh exposed surface perhaps loses a very small additional per cent of moisture and, being released from restraint of a part of the "shell", shrinks a little more.

(*d*) *Increase of strength.*—So far there have been considered in connection with the removal of moisture from wood only the changes in size and form that takes place in drying. There are two other important results of seasoning wood becomes *much stronger* in the dry than in the wet state, and also *much more durable.* Wood becomes stronger when dried, both absolutely, that is, in quality and relatively, that is, in proportion with its dimensions. The dry fibres in themselves are harder and stiffer than when wet, and, moreover, they cohere more strongly. Relatively to size, a dry one inch square is stronger than a wet one of the same size because, owing to the shrinkage that takes place, there is a considerably larger number of fibres per unitarea in the dry stick. Roughly speaking, air-dry wood containing 12 per cent of moisture is 1 and 1½—2 as strong as when green; and kiln-dried to one per cent of moisture, a piece of spruce was found to be four times as strong as a green stick of the same size. Keeping in mind, however, the fact that kiln-dried lumber reabsorbs

from the atmosphere an amount of moisture almost or quite equal to what is contained in the air-dried stick, it is evident that the ratio given for air-dry lumber is the one that has the most practical value. Also, it must be understood that this applies to selected pieces of moderate size; investigations of the United States Forest Service show that, in clear pieces up to 2″ by 2″, the strength invariably increases as the moisture content is lowered, but that above that size the increase is very irregular. In large pieces, due to internal strains and both internal and superficial checks caused by irregular drying and shrinking, the proportional increase in strength is generally much less, and in badly checked pieces there is often even a decrease from the green to the dry state.

(*e*) *Decay.*—Wood is more durable when thoroughly dried, because decay does not take place without moisture. All forms of decay in wood are caused by bacteria or by fungi, principally the latter. Fungi are plants whose soil is vegetable or animal matter and, like other plants, they require oxygen, water and a certain degree of heat, though many of them require little or no light. Deeply and permanently submerged in water, or buried so deep as to prevent the access of air, wood does not rot, because fungi are deprived of oxygen; exposed to air, but protected from water, it does not rot because the fungi can obtain no moisture. Different kinds of decay are popularly known as "bluing" or "sap-stain," as "wet-rot" and "dry-rot." "Bluing," which is common in the sapwood of Conifers (pines, etc.), in Parkia and other light woods of the Leguminosæ family, in Sideroxylon, etc., is caused by certain fungi, or in certain cases perhaps bacteria, which apparently attack only the contents of the cells, but not the cell-walls, so that bluing affects the appearance of the wood, but has little effect on its strength.

(*f*) *Wet-rot and dry-rot.*—Wet-rot is the decay that takes place when the presence of moisture is more or less evident to the eye. The fungi that cause it grow through all the elements of the wood and more or less completely destroy the cell-walls, bringing about in time the entire disintegration of the wood. Dry-rot is not essentially different from wet-rot; the fungi that cause it are such as can live and grow with only the small amount of moisture present in apparently dry wood, or supplied by the surrounding atmosphere. From these statements it will be seen that seasoning or drying wood, provided it is done early and rapidly enough, not only absolutely prevents decay (unless the wood be subsequently again subjected to moisture), but that even incipient decay may be stopped by subsequent drying.

(*g*) *Weathering.*—In addition to the decay properly known as "rot," there is one other cause of the destruction of wood, namely, "weathering." This is probably purely a chemical process of oxidation, sometimes hastened by the abrasive action of sand or dust-laden winds; but it is merely superficial, and generally so slow as to be negligible when compared with the action of decay or of insects. Only in very dry and windy desert regions is the abrasive action of sand an appreciable factor in the destruction of timber.

(*h*) *Insects.*—Dry wood is less liable to be attacked and destroyed by insect enemies than is green or moist wood.

This is due principally to the fact that green wood is softer, and, partly also, to the nutritive elements being easier of assimilation than those of dry wood. It is certain that both various fungi and some insects work only in living trees, dying or abandoning the wood, as the case may be, when the trees are felled or when the wood is sawn up and seasoned.

(*i*) *Surfacing and finishing.*—Finally, not only can dry wood, on account of its greater hardness and density, be surfaced more perfectly and given a smoother finish of paint or varnish, than can green wood, but the finish is more intimately incorporated into it, and so is less likely to peel off, crack, or become dim as it so commonly does on unseasoned wood.

(*j*) *Benefits of drying.*—To summarize the advantages of drying timber:—

(1) It decreases the weight, almost always an advantage, as great weight is desirable in wood only for special purposes; (2) by bringing about the maximum possible shrinkage, it lessens the liability of future changes of form or size; (3) it increases the strength very largely, at least in selected pieces; (4) it prevents or arrests decay, unless the wood is subsequently subjected to moisture, but even under the most severe conditions, a well-seasoned piece begins to decay more slowly than a green one; (5) it lessens the liability to attacks by insects; (6) it increases the capability for receiving and retaining a fine and permanent finish.

(*k*) *Time required for seasoning.*—The time required for thoroughly air-drying timber varies considerably; firstly, it has already been shown that it largely depends on the dimensions of the piece (the smaller the piece or, rather, the greater the amount of surface exposed, barked timber rather than unbarked, converted timber rather in the round, plank wood rather than any other form of converted timber, vebeer rather than normally converted timber)—the more easily can fermentible matters be soaked out, and the more easily and quicker can it be dried with the minimum of defects in the shape of shrinking, warping and cracking; and, secondly, (leaving the question of dimension on one side), in different species and according to external circumstances. As a rule, light soft woods season much

more rapidly than dense hard ones, although the latter generally contain much less water when green. Also the season of the year has much to do with it, not so much as concerning the original water content, but as influencing the temperature and humility of the air. A very large part of the moisture in fresh woods evaporates during the first few weeks. A typical test case is the following, made during the hottest and driest months in America (July to September):—First three weeks loss of weight over 30 per cent of the green wood, end of the next three weeks another 6 per cent bringing the loss up to about 36 per cent, end of the following six weeks only another 4 per cent, bringing the total loss to nearly 40 per cent. Now, the significant fact here is not the rapidity of evaporation in the beginning, but its extreme slowness during the last six weeks; probably one-half, or more, of the original weight of the ties was water, and it is easy to see that it would take many months to reduce them to an even approximate air-dry condition. The time of the year, when lumber is sawn and the process of seasoning begins, may have a considerable influence not only on the first steps of this process, but also on the quality of the final product. It is hardly necessary to say that, if sawn timber is first exposed to the air during the hottest and driest months, it will begin to season much more rapidly than during the height of the rainy season. To appreciate the final effect of this, what was said about rapid and slow seasoning must be remembered, namely, that rapid seasoning most effectively prevents, or at least minimizes, bluing and deterioration by decay and insects, but, on the other hand, intensifies all the various defects caused by irregular shrinkage, that is, warping, twisting, splitting, case-hardening and superficial or internal checking. Soft, light and perishable woods, therefore, would best be sawn and piled at the beginning of the hot season, so

as to get rid of the greatest amount of moisture in the least possible time. Hard, dense and durable woods, and especially such as case-harden and warp badly, should be rather sawn and piled at the beginning of the rainy season so that the first stage in drying may be as slow as possible. In ordinary work, where only a fair degree of freedom from shrinking and warping is required, one-inch boards of such woods as Red Cedar (Cedrela), the softer Dipterocarps and the soft Leguminosae, can be used when only a few months old; but for good flooring or inside finish, and for fine furniture and cabinet-work they should be air-dried (under roof and well ventilated) at the very least for one year. Hard, dense woods, such as Vitex, Cassia, Albizzia, Calophyllum, and above all the Ebonies (Diospyros and Maba) require still longer periods. One-piece table-tops, which in the rough are generally upwards of 1½ inches thick, should never be made up until at least a year old, and then after dressing down as described above. In Europe, where freedom from warping, cracking, etc., is essential, as owing to the climate drying is very slow, joiners, cabinet-makers, turners, musical-instrument makers and others think nothing of keeping wood in stock seasoning—usually at first in dry cool cellars, later in shady court-yards, and finally in airy dry lofts—for from five to seven years or longer. Thus, whilst, on account of the heat in tropical climates, fermentation sets in much more rapidly than in Europe, so, for precisely the same reason, air-drying is much more rapid also. To dry sawn timber properly by natural means, only two things are essential—protection against sun and rain, and thorough ventilation; protection, because green lumber, exposed to the sun, warps and splits more than it does under cover, and alternate wetting and drying not only intensify these defects but also increase the danger of decay; ventilation, because lumber in solid piles or in a closed storage

place (so especially in the log, and still more so in the unbarked log), dries out slowly or not at all, and, unless of an extremely durable species, rots before it dries. The prime requisite therefore for storing fresh or partly seasoned timber is a roof. This is probably even more important in the tropics than in the temperate zone; especially is this the case in a country like the Philippines (or on the West Coast of India), where dry weather is the rule for only a few months of the year, while temperature remains high even during the rainy seasons. There is no doubt that "Board-leaf" woods suffer more from exposure to weather whilst seasoning than do the conifers (Pines, Firs, Spruces, Cedars, etc.) and almost all tropical woods are of the former class; in addition to this, sun and rain in the tropics contribute more to the mechanical destruction of lumber than they do in the cooler, drier climates, while the constant heat and humidity also increase the loss by staining and decay. Second, lumber must not lie on the earth, nor on the floor of the building. Stone, concrete, or wooden cross-sills should be provided to hold the piles, at least 1 to 2 feet above the ground. Third (and this is by no means the least important item), no two pieces should be piled on top of one another; cross-sticks of uniform thickness (the commonest and probably the best practice is to use 1-inch squares) must be put between every two layers. The sticks should be thoroughly dry, so as not to contribute to staining and decay at the points where they touch the lumber; they should not be more than three feet (preferably two feet) apart; they must be carefully laid in vertical rows, directly above one another, to prevent the boards from being bent, and the two end rows should be placed at the very end of the lumber in the pile to prevent cupping of ends and minimize splitting. In the case of valuable timber, cross-sticks should be put on top of the pile and loaded with other lumber to prevent

the uppermost boards from warping. Heavier timber, such as 2 or 3-inch planks, and large dimension stuff may be laid on sills more than three feet apart, but no dimension stuff should have less than three points of support unless it is unusually short and heavy.

(*l*) *Kiln-drying and steaming followed by air-drying.*—Since the invention and development of kiln-drying, it has sometimes been stated that it is impossible to season wood naturally as well as it can be done in the kiln. On the other hand, it is alleged that kiln-drying is only a rapid way of doing what nature does better, though at the expense of more time. Both these statements must be accepted with some reserve. It is probably true that, in spite of all the most recent improvements made in kilns, certain very refractory woods season better if at least the first steps of drying take place by the slow natural process, provided that the lumber is meanwhile protected against the weather. Also, as has been stated above, wood will, if given time enough, dry out so far that it no longer swells and shrinks except to the slight extent caused by changes of the atmosphere. But thorough kiln-drying reduces even this to a still slighter amount, because it lessens the capacity of the wood to reabsorb atmospheric moisture. Woods much subject to fungus and insect attacks are protected by being seasoned quickly in the kiln. And, finally, certain very refractory woods, which formerly had no market value whatever (e.g., Red Gum), have become available for even fine cabinet-work solely through the agency of careful and thorough kiln-drying. So, taking into account the lessening of work, the economy of time and the improvement of the product, there can be no doubt but that kiln-drying on the whole is the better process. This statement does not take into account, however, the process of steaming followed by air-drying, which is described further on. The choice between various

methods depends in case on many circumstances. In small operations, the construction of expensive sheds or of still more expensive dry-kilns or steaming apparatus may be economically impossible. Where very large numbers of species of wood are to be handled, kiln-drying, though not impossible, is rendered difficult by the fact that woods of widely varying character do not respond equally to the same treatment, and the separation and increased handling makes the operation expensive; while in large opera-handling a comparatively small number of woods, the saving in time in putting a seasoned product on the market easily compensates for the outlay in preparing it. On the other hand, the question of results attained may be more important than that of expense. Broadly speaking, rapid drying is liable to produce poorer lumber than slow, as it intensifies all the bad results of rapid and uneven shrinkage. Yet, in the case of woods liable to bluing, or to fungus and insect attacks, rapid drying is necessary, while durable wood, not subject to those dangers, may be seasoned as slowly as convenient. It is evident that no method, or combination of methods, can be unqualifiedly recommended for a given case without carefully considering the circumstances of the case and the results required. The first attempts to season wood artificially on a commercial scale were made by storing lumber in closed chambers with a circulation of air heated by means of furnaces or of steam coils. As far as actual drying went the process was alright, but, whilst most of the coniferous and, among the broad-leaf woods, certain light porous species which season rapidly and evenly in the open air were little injured in the kiln, a large proportion of the latter (and even some conifers) suffered so much from warping, case-hardening, and consequent superficial and internal checking that kiln-dry by many wood-users was believed to be worse than

useless; the dry-air kiln is now practically obsolete. When it was realized that the chief defect of the dry-air kiln was the uncontrolled and excessively rapid evaporation from the surface, experiments were made with moist air. Exhaust steam, live steam and water-jets have been used to supply the proper amount of moisture. Though moist-air kilns were a distinct advance, the earlier ones failed, as a rule, to provide one essential, namely, the heating of the timber through its entire thickness and maintaining it at a sufficiently high temperature throughout the whole process. Moreover, the manufacturers and users did not take sufficient care exactly to ascertain and maintain the necessary amount of circulation and the proper degrees of heat and humidity. The use of positive means of regulating these conditions, aided by thermometers, hygrometers, etc., is doing much to improve results. Some of the most recent types of kiln employ live steam under pressure to secure the complete penetration of heat into the interior of the wood. The earliest experiments along this line believed it to be sufficient to heat the wood in this way for a certain period, ranging from a few hours to several days, and then completely shut off the steam. In this way, it was believed that the expansion taking place on removing the pressure would be sufficient to drive out and evaporate all the moisture in the wood. The theory failed to take into account the fact that the heat in the interior was absorbed by expansion and evaporation before all the water was driven out. The result was that such timber, although apparently dry on the surface, frequently came out of the kiln with a considerable amount of moisture still remaining in the interior. The use of steam at high pressure involves also the danger of weakening the wood permanently. The most recent summing up of the results of experiments in kiln-drying is as follows:—The Forest Service (U.S.) has for a

number of years made experiments in drying lumber on a small scale and has reached what are believed to be fundamental principles. To apply them effectively will require expert knowledge until the proper constants of operation have been determined, because no one detailed method of operation can be prescribed at the present time. It is believed, however, that great improvements in the method of drying can be secured by applying these conclusions . . . The experiments made by the Forest Service indicate that successful dry-kiln operations require the observance of the following points, which embody the basic principles of the process:—(1) the timber should be heated through before drying begins; (2) the air should be very humid at the beginning of the drying process and should be made drier only gradually; (3) the temperature of the lumber must be maintained uniformly throughout the entire pile. For this an exceedingly large circulation of air is essential; (4) control of the drying process at any given temperature must be secured by controlling the relative humidity, not by decreasing the circulation; (5) in general, high temperatures permit more rapid drying than do low ones. The higher the temperature of the lumber, the more efficient the kiln. It is believed that temperatures as high as the boiling point of water are not injurious to most woods, providing that all the other fundamentally important factors are taken care of. Some species, however, may not be able to stand as high a temperature as others; (6) the degree of dryness attained, where strength is the prime requisite, should not exceed that at which the wood is to be used. The rules above quoted apply, of course, to the actual drying of lumber in the kiln. Various processes of steaming have been tried which failed, for the reason previously explained, to give satisfactory results, that is, really to dry the lumber. Recently, however, steaming has again

been introduced, not to dry the timber, but merely to prepare it for rapid air-drying. The felling, transportation of logs, and sawing are all carried on with the greatest possible rapidity, so that the timber may enter the steam cylinder as nearly as may be in the green state. After steaming at a low pressure for a short time, the lumber is taken out and left to dry in the open, preferably under sheds, as indicated in paragraph 3 (2) (*k*). In addition to the central feature of the process, great care is used in sorting the timber by species and sizes, and in stacking it very exactly. If the results are as good as claimed, both as to saving of time and excellence of the product, this is no doubt due, not only to the steaming process, but also in large measure to all these other precautions.

Epitome.

(1) Cambium is the mucilaginous layer between bark and wood.

(2) Proteins (Protoplasam, Albuminoids, etc.) are nitrogenous matters most rapidly decomposing when moist, starting fermentation.

(3) Starch—including sugars, mucilages, and cognate products—occurs, as cell-contents, chiefly in cambium, less in sapwood, and least in heartwood.

(4) Starch ferments rapidly in Indian temperatures, very slowly in European.

(5) Fermenting starch causes mildew, mildew discolours and starts rot in the lignin of the cell-walls.

(6) Fermentation occurs on cessation of sap-circulation ; it is checked by drying.

(7) Insects largely feed on starchy matters, especially when moist.

(8) To minimize mildew and insects, felled trees should be barked immediately.

(9) Proteins and starch can be largely reduced by soaking in water, especially in running water.

(10) Soft-woods are generally all sapwood, and should be soaked immediately after barking.

(11) Fermentation and rot cannot occur in, and insects cannot attack (*a*) submerged, (*b*) perfectly dry, logs.

(12) Seasoning consists in (*a*) removing fermentible matter, and (*b*) drying.

(13) Green timber contains nearly half its weight in moisture.

(14) Unbarked logs left lying in the forest are not seasoning but putrefying.

(15) Soft-woods suffer mostly from mildew, and only slightly from cracking.

(16) Soft-woods are mostly porous and loose-textured; hard-woods are small-pored and close-textured.

(17) Porous loose-textured woods can dry quickly from within and from without.

(18) Soft-woods require much soaking and rapid drying; and dry best in the hot weather.

(19) Hard-woods suffer slightly from mildew, but much from cracking.

(20) Hard-woods dry faster outside than within, shrink externally and so crack.

(21) The quicker hard-woods dry externally, the more they shrink, case-harden, crack and warp.

(22) In hot weather hard-woods lose one-third of their weight in three weeks, a further one-tenth only of their weight in the next nine weeks.

(23) In hard-woods with copious heartwood fermentible matter can be reduced by "girdling".

(24) "Girdling" is the removal of a cylinder of bark and sapwood entirely round the tree, exposing the heartwood.

(25) Normally crude sap rises from the root through the cambium and adjoining tissue to leaves, and descends elaborated through remoter tissue.

(26) By girdling, sap no longer rises, but existent sap in the tree descends.

(27) Girdling must be done many months before felling.

(28) For slow-drying of hard-woods, it is best to start in the rains, continuing thereafter through the cold and hot weather.

(29) Drying is more rapid, cracking, shrinking and warping less, the smaller the piece, or the larger the surface exposed.

(30) For good seasoning, whether for soft or hard-woods, it is advisable to cut up soon after felling.

(31) By leaving in log or squared baulk, seasoning is never so good as in scantling and planks.

(32) If a log cannot be converted at once, it can be left submerged.

(33) In Europe drying is very slow; small pieces often take five years.

(34) Elimination of starch quickens drying; starch is hygroscopic.

(35) Elimination of starch reduces cracking and warping; starch retains internal moisture.

(36) Shrinkage is twice as much tangentially as radially; outside planks warp most.

(37) Seasoning timber must not lie on the ground, but on cross-sills 1 to 2 feet above it.

(38) No two pieces should be piled on top of each other without cross sticks between layers.

(39) Unless very short, seasoning timber should have at least three supports.

EUROPEAN (FRENCH) TIMBERS.

French timbers botanically arranged.

Berberis vulgarie (Barberry) (see 24).
Tamarix gallica (Tamarisk), 20.
Tilia europaea (Linden ; European Lime), 2.

Acer pseudoplatanus (Sycamore), 56.
Acer platanoides (Norway Maple), 57.
Acer campestris (Maple); 55.
Acer monspelliensis (Montpellier Maple), 62.
Æsculus hippocastanum (Horse Chestnut), 8. *
Euonymus europaeus (Spindle tree) (see 51).
Ilex aquifolium (Holly), 58.
Zizyphus vulgaris (African Mahogany), 51.
Rhamnus alaternus (Evergreen Buckthorn), 50.
Rhamus catharticus (Buckthorn) (see 42).
Rhamnus frangula (Berrybearing Alder) (see 4).
Pistacia terebinthus } (Mastic), 49.
Pistacia lentiscus
Rhus cotinus (Sumac) (see 25).
(Cytisus Laburnum) } (Laburnum), 48.
Laburnum anagyroides
Robinia pseudacacia (False Acacia), 45. *
Ceratonia siliqua (Carob), 37.*
Prunus amygdalus (Almond), 32.*
Prunus persica (Peach), 21.*
Prunus cerasus (Cherry), 36.
Prunus mahaleb (Mahaleb Cherry) (see 42).
Prunus domestica (Plum), 35.
Prunus spinosa (Blackthorn, Slœ) (see 63).
Cratægus monygynum (Hawthorn, May) (see 58).
Pyrus communis (Pear), 41.
Pyrus malus (Apple), 42.
Pyrus aria (White Service), 59.
Pyrus aucuparia (Mountain Ash, Rowan), 40.
Pyrus torminalis (Torminal), 30.
Pyrus sorbus (Service), 63.
Myrtus communis (Myrtle) (see 42).
Cornus mas (Dogwood, Cornel) (see 63).
Cornus sanguineum Blood Cornel } (see 42).
Bugwood
Sambucus nigra (Elder), 24. †

Arbutus unedo (Arbutus, Strawberry Tree), 38.

Erica arborea {Tree Heath / Briar-pipe Wood} (see 4).

Rhododendron ferrugineus (Rusty Azalea) (see 4).

Rhododendron hirsutus (Hairy Azalea) (see 4).

Fraxinus excelsior (Ash), 53.

Olea europaea (Olive), 64.

Morus alba (White Mulberry), 33. *

Celtis australis (Nettle Tree), 52.

Ulmus campestris (Elm), 46.

Buxus sempervirens (Box), 65.

Juglans regia (Walnut), 23.*

Fagus sylvatica (Beech), 31.

Castanea vesca (Chestnut), 47.

Quercus Robur (Oak) (pedunculata) (Peduncled Oak Black Oak) (sessiliflora) (Sessile Oak, White Oak), 44.

Quercus cerris (Turkey Oak), 61.

Quercus Ilex (Holm Oak, Evergreen Oak), 60.

Quercus suber (Cork Oak), 66.

Corylus avellana (Hazel) (see 26).

Carpinus betulus (Hornbeam), 54.

Betula alba (Birch), 26.

Alnus glutinosa (Alder), 19.

Platanus orientalis (Plane Tree), 34.

Salix alba (White Willow), 3.

Salix fragilis (Crack Willow), 7.†

Salix capraea (Sallow), 4.†

Salix pedicellata (Glaucous Sallow) (see 4).

Populus tremula (Aspen), 14.

Populus nigra (Black, or Lombardy, Poplar), 9.

Populus alba (White Poplar, Abele), 15.

Populus canadensis (Canada Poplar), 16.*

Taxus baccata (Yew), 27.

Juniperus oxycedrus (Oxycedar, Mediterranean Pencil Cedar), 5.

Juniperus communis (Juniper), 6. †

Cupressus sempervirens (Evergreen Cypress, Italian Cypress), 25.*

Abies pectinata (Silver fir, White Deal), 10.

Picea excelsa (Spruce, White Deal), 11.

Larix europaea (Larch), 17.

Cedrus Libani (Cedar, Deodar, Cedar of Lebanon), 22.*

Pinus sylvestris (Scotch Fir, or Pine) (Red Deal), 18.

Pinus montana (Mountain Pine), 1.

Pinus laricio (Corsican, or Austrian Pine), 28.

Pinus halepensis (Aleppo Pine), 43.

Pinus pinaster (Maritime, Star, or Cluster, Pine), 29.

Pinus pinea (Stone, or Italian, Pine), 30.

Pinus cembro (Cembro Pine), 12.*

Pinus strobus (Weymouth Pine American White Deal), 13.

Swietenia Mahagoni (Mahogany) (not plant but timber largely used) 42 (bis.).

* (Just above the last letter of botanical name) = Exotic, planted and wood used.

† (Just above the last letter of botanical name) = Tree, not more than 1 foot diameter.

For other references and abbreviations see end.

FRENCH WOODS.

I.—Soft to Very Soft.

A.—Reddish.

1. Mountain Pine (75′ × 1½′) (Fr. Pin de montagne —Pinus montana). Sapwood white, heartwood light red; soft, fissile; durability, usually durable but variable like 18. Scotch Fir (q.v.), II to IV, easy to work and to split; Wt. 28—38, Av. 33; Rays, ff., very numerous; Pores, none. *Uses.*—Construction work, industrial work, carpentry work, military buildings (Mathieu); turnery and wood carving (Schlich).

2. Linden (60′ × 15′) (Fr. Tilleul—a petites feuilles; intermediaire; a grandes feuilles—Tilia Europæa). Uniformly pinkish-white; soft; durability, not durable,

only so when kept dry, and even then liable to be worm-eaten, IV to V; Wt. 31—36, Av. 34; Rays, m—f., slight silvergrain; Pores, m—s. *Uses.*—Not for construction, joinery, cabinet-work, furniture, by turners, and for sabots (Mathieu); fine carving, founders' patterns, under veneer for turnery, in pianos and organs, wooden shoes, papier-maché, etc. (Schlich).

3. WHITE WILLOW (75′ × 3′) (Fr. Saule blanc—Salix alba). Pale red, uniform; soft; durability, not durable, only so when kept quite dry, IV to V; cuts well in all directions, does not crack; Rays, ff; Pores, s. *Uses.*—Sculpture, slats, etc. (Mathieu); cricket-bats, withes, baskets, fascines, in furniture under veneer, packing-cases, papier-maché, cart-lining (being soft and tenacious) (Schlich).

4. SALLOW (35′ × 1′) (Fr. Saule marceau—Salix capræa). Light or yellowish red gradually becoming vinous red towards centre; soft; durability, slightly more durable than the last, but only so when kept dry, IV to V; does not cut so well but splits well; Wt. 24—45, Av. 36; Rays, ff; Pores, s. *Uses.*—Hop-poles and vine-props, and long thin slats for mat-making (Mathieu); same as for WHITE WILLOW (see 3) (Schlich).

Under 1-foot diameter.

Rhamnus frangula (Berry-bearing Alder; Fr. Bourdaine commune) (Schlich). *Uses.*—Wooden-basket slats.

Erica arborea (Tree Heath, Briar-pipe wood; Fr. Bruyere en arbre) (12′ × ½′). *Uses.*—Roots for briar-pipes.

Rhododendron (ferrugineus) (Rusty Azalea; Fr. Rhododendron ferrugineux) (Schlich).

Rhododendron hirsutus (Hairy Azalea; Fr. Rhododendron hérissé) (Schlich). *Uses.*—Similar (as in wood) to last.

Salix pedicellata (Glaucous Sallow; Fr. Saule pédicellé) (Schlich). *Uses.*— ?

B.—Yellowish.

5. OXYCEDAR, or MEDITERRANEAN PENCIL CEDAR (20′ × 2′) (Fr. Genévre oxycédre—Juniperus oxycedrus). Tawny or very light yellowish brown, scented; soft but very homogeneous and compact; durability, durable, cuts well and takes fine polish; Wt. 40—46, Av. 43; Rays, ff., very numerous; Pores, none. *Uses.*—Veneering for fine cabinet-work (small chests, necessary tables, etc.), and lead-pencil slats.

6. JUNIPER (20′ × 1′) (Fr. Genévrier commun—Juniperus communis). Yellowish white, becoming brownish or reddish yellow towards centre, scented; soft but very tenacious and compact; durability, durable and cuts well; Wt. 34; Rays, ff., very numerous; Pores, none. *Uses.*—No defined use, but used in different ways (Mathieu).

7. CRACK WILLOW (40′ × 1′) (Fr. Saulé fragile—Salix fragilis). Light yellow becoming brownish or reddish yellow towards centre; soft; durability, not durable except when kept quite dry, IV to V; Wt. 24—32, Av. 28; Rays, ff; Pores, s. *Uses.*—(Rarely becomes a tree, and seldom found in the forest), sculpture, slats, when big enough (Mathieu); withes, baskets, fascines, cart-linings when big enough (Schlich).

8. HORSE CHESTNUT (Exotic) (60′ × 3′) (Fr. Marronier d'Inde—Æsculus hippocastanum). Yellowish white; very soft and very poor; durability, very poor, decays rapidly, V, warps and cracks little but does not cut and work clean; Wt. 30—34, Av. 33; Rays, ff; Pores, ss. *Uses.*—(Introduced from Central Asia), box-making slats (Mathieu).

9. BLACK or LOMBARDY, POPLAR (Exotic) (110′ × 12′) (Fr. Peuplier noir, Peuplier d'Italie—Populus nigra). White becoming brownish grey towards centre; very soft and very porous; P = 303, stiffness 44/100 oak, toughness 57/100 oak; durability, poorest of the genus, V, knotty, fluted, difficult to work; Wt. 22; Rays, ff;

Pores, m. *Uses.*—(Introduced from the Caucasus, Persia and the Himalayas), veneering of 1/6-inch thickness from knotty wood for cabinet-work (Mathieu); rafters and rails, joinery, wheelwrights' work, packing-cases, coarse carving, cigar-boxes, matches, papier-maché, cart-lining (Schlich).

C.—White.

10. SILVER FIR, or WHITE DEAL (120′ × 6′) (Fr. Sapin —Abies pectinata). White or very light yellowish or reddish brown, not scented; soft, no resin-channels very elastic; durability, fairly durable but less so than most conifers from defect of resin, only used under cover, III from moderate altitudes but even then more suited for under cover, IV to V from lowlands and should only be used under cover as it is very perishable when exposed to the air and moisture and in hot sandy soils, works well and splits easily; Wt. 24 40, av. 32; rays ff; pores none; *uses*—civil constructions, masts for mercantile marine, beams, planks and boards, laths, etc., split-wood for cooperage, shingles, etc. (Mathieu); used for the same purposes as SPRUCE (see 11), especially useful in building for pillars, and also in hydraulic works; in some European districts it is less prized than SPRUCE, partly most that comes to the market is too old and knotty that it cannot be so easily planed as SPRUCE in Great Britain, SILVER FIR is superior to SPRUCE (Schlich).

11. SPRUCE, or SPRUCE FIR, or WHITE DEAL (120′ × 3′) (Fr. Epicèa—Picea excelsa).—White or (when inferior from the north) reddish white, with a slight resinous scent; very soft and spongy when grown in low or marshy localities to moderately hard when grown on high hills, contains resin channels; P = 425 to 631, stiffness 72/100 to 104/100 oak, toughness 60—104/100 oak; durability—very variable, softer quality not

durable, harder durable, mean quality like SILVER FIR (see 10) and fairly durable under cover and out of moisture, III from high altitudes or latitudes, resinous and with narrow zones (Baltic White Deal), IV to V from lowlands and should only be used under cover being very perishable when exposed to the air or moisture, works well and splits easily; wt. 20—30, av. 28; rays ff; pores none; *uses*—civil constructions, masts for mercantile marine, planks and boards, beams and laths, etc., split-wood for cooperage, shingles (all mean quality); (best class with very close increments grown on high hills) sounding boards for musical instruments (pianos, violins, etc.); (inferior class) matches and paper-pulp for both paper and most excellent cardboard (Mathieu); logs are used in constructions of all kinds, and in boats for fresh-water traffic, sawn timbers used by the joiner, cabinet-maker, wheel-wright and shingle-maker, for boxes, packing-cases, toys, piano-making and organ-building, poles and saplings used for agricultural purposes, ladders, telegraph-posts, fencing, vine-stakes, wooden baskets and paper-pulp (Schlich).

12. CEMBRO PINE (75′ × 4′) (Exotic) (Fr. Pin. cembro—Pinus cembro).—White, slightly veined, very slightly reddish tinted towards the centre, resinous scented; soft fairly homogeneous, with resin channels; durability—fairly durable under shelter and away from moisture, IV; wt. 26—33, av. 29; rays ff; pores none; *uses*—no good for construction, but for fine joinery, sculpture, toys and shingles (Mathieu); used for wood-carving, toys and cabinet-making (Schlich).

13. WEYMOUTH PINE, or WHITE AMERICAN DEAL (Exotic) (180′ × 8′) (Fr. Pin Weymouth—Pinus strobus).—White, very slightly reddish tinted towards the centre, scarcely resinous, scented; soft, homogeneous, lacking in elasticity; durability—poor, loses half its weight in drying, V, warps considerably, easy to work, but not

much prized even in its native localities; P = 577; stiffness 99/100 oak; toughness 103/100 oak; wt. 20—30, av. 25; rays ff; pores none; *uses*—poor masts wanting in suppleness, resistance and duration; in America it is claimed to produce excellent masts, wood for carpentry, bridges, cooperage and fancy goods, but, allowing for difference of growth, the claim seems largely exaggerated (Mathieu); used in superstructures, especially roofs, also in cabinet-making, packing-cases, etc., old wood being preferred (Schlich). (Imported from America and E. Asia).

14. ASPEN (100′×1½′) (Fr. Peuplier tremble—Populus tremula).—White, little or not tinted towards the centre; soft; durability—not durable except when kept quite dry, IV to V; wt. (?) probably much the same as WHITE POPLAR (see 15); rays ff; pores ss; *uses*—not used for constructions nor industrial purposes, but gives the best and whitest paper-pulp and is used for matches (Mathieu); uses same as BLACK POPLAR (see 9), and for match-making (Schlich).

15. WHITE POPLAR, or ABELE (100′×3′) (Fr. Peuplier blanc—Populus alba).—Sapwood white or lightly tinted with yellow or pink, heartwood light red clearly defined, shining; very soft and pale in the north to soft heavier and deeper-coloured in the south; P = 522; stiffness 66/100 oak; toughness 112/100 oak; durability—variable according to region of growth, but never durable except under cover and away from moisture, IV to V; wt. 28—44, av. 36; rays ff; pores s; *uses*—none (given by Mathieu); rafters and rails, wheel-wrights' work, packing cases, cigar-boxes, wood-carving, organ-building, matches, papier-mache (Schlich).

16. CANADA POPLAR (100′ × 3′) (Fr. Oeuplier de Canada Populus canadensis).—White, sometimes Reddish tinted towards centre; Soft, homogeneous, free from

knots; durability, not durable except under shelter and away from moisture, IV to V; Wt. 24—28, Av. 26; Rays ff; Pores ss; *uses*—(introduced from N. America). Box-making, joinery and small carpentry (Mathieu); same as WHITE POPLAR (see 15), except organ-making (Schlich).

II.—MODERATELY HARD.

A.—Reddish.

17. LARCH (100′ × 2′) (Fr. Méléze—Larix europaea)—Sapwood yellowish white, heartwood red-brown quite distinct, resin-scented; moderately hard, very elastic, containing resin channels; P = 608; stiffness 79/100 Oak; toughness 134/100 Oak; durability, very durable II, when grown on high hills ("The Oak of the Hills") with great strength and elasticity and greater weight, is then not attacked by insects and does not crack but works easily, best when grown in Alpine localities of 4,000′ to 5,000′ and not too old; in the plains and lowlands it is inferior III and with little heartwood, being no better than ordinary SCOTCH FIR (see 18); when tapped for resin still less durable IV; Wt. 29-42, Av. 35; rays ff, very numerous; pores none. *Uses.*—Civil construction, hydraulic and naval building (masts side-planking and framing), shingles, cask-staves, vine-props and waterconduit pipes (Mathieu); used for the same purposes as Red Deal (SCOTCH FIR, see 18), and, whenever durability is demanded, more highly esteemed than the latter (Schlich).

18. SCOTCH FIR or PINE, RED DEAL, RIGA or BALTIC DEAL (120′ × 4′) (Fr. Pin sylvestre, Sapin rouge du Nord—Pinus sylvestris)—A most variable species. Sapwood white or yellowish white very inferior, very abundant and may practically constitute the whole wood of the tree in young trees, in trees grown in damp compact soils or in those grown towards its southern

limit; heartwood pink-red, red or red-brown, resin-scented, wanting in resin and lignification homogeneous and easy to work in the extreme North (about 69° N, where the trees grow only about 45′ × 1′) = and full of resin lignified and hard to work in the North (about 60° N, where the trees attain their greatest dimensions); soft (sapwood and inferior growth) to moderately hard, very elastic when lignified and saturated with turpentine; P = 268 (English) to 425 (Memel, Riga); stiffness 55/100 (E) to 114/100 (M., R. Oak; Toughness 65/100 (E) to 56/100 (M., R., Oak); Durability, very variable according to the conditions of vegetation soil and age, the resinous lignified wood of the north being very durable, II, very elastic, very strong and difficult to work, III when rapidly grown with narrow zones of summer wood and only moderately resinous easy to work coming from the extreme north, whilst that of the south or damp areas quickly grown and slightly resinous or of sapwood generally very poor IV and should only be used under cover, being perishable when exposed to the air or moisture; Wt. 25–52, Av. 39; Rays ff, very numerous; Pores none. *Uses.*—Northern timber gives construction timber equal to the best Oak for civil and naval constructions and the best mast-wood known, extreme northern timber gives the best wood for fine cabinet-work; boards and planks (especially for joinery), split wood, telegraph-poles, shores, mine props, and wainscotting (Mathieu); used for the same purposes as SPURCE (see 11) except for musical instruments, shingles and other split ware, superior to SPRUCE (see 11) or SILVER FIR (see 10) for hydraulic works (piles), bridges or mining timber used for railway sleepers and all purposes requiring durability, esteemed for ship masts and spars, for windmills, conduit pipes, street paving, etc. (Schlich).

19. ALDER (100′ × 3′) (Fr. Aune glutineux, Aune blanc Alnus glutinosa). Light red uniform with

conspicuous silver-grain from broad false rays which are really numerous very fine rays alternating with layers of fundamental tissue; moderately hard, brittle; P = 454; stiffness 63/100 Oak; toughness 101/100 Oak; Durability, decays rapidly under alternations of dryness and damp, fairly durable under cover but liable to be worm-eaten and brittle and warps and cracks V, but under water IV and sometimes nearly as durable as Oak; Wt. 28–42, Av. 35; Rays Biform b (false) few, ff many; Pores s. *Uses.*—Hydraulic works (water troughs and conduits, well and mine timbers), household implements, common furniture, cooperage, sabot-making (Mathieu); used underground in mines, for covering damp places, water conduits, largely used for cigar-boxes, clogsoles, rarely carved (Schlich).

A.—Reddish.

20. TAMARISK (30′×1′) (Fr. Tamarix de France—Tamarix gallica). White or yellowish white passing to a fairly bright red towards centre; moderately hard; Durability, not durable, V, very brittle, warps and cracks a great deal; Wt. 40—50, Av. 45; Rays m, with pronounced silver-grain; Pores m-r, largest in shipping-wood. *Uses.*—(None given by either Mathieu or Schlich.)

21. PEACH (Exotic) (25′×1′) (Fr. Pecher commun—Prunus persica). Sapwood white, small, heartwood deep chestnut brown veined; moderately hard; Durability not durable except under cover and away from moisture, IV to V; Wt. 46; Rays b, giving a conspicuous silver-gain; Pores m. *Uses.*—(Introduced from Persia) Cabinet-work and inlaying (Mathieu).

B.—Yellowish to yellowish brown.

22. CEDAR, CEDAR OF LEBANON OR DEODAR (120′×9′) (Exotic) (Fr. Cedre de Libanon, dedrus Libani).

Sapwood white, heartwood brown or yellowish brown sometimes with a reddish tint, scented; moderately hard, very homogeneous, without resin channels, less strong and elastic than SILVER FIR (see 10), but a first-class wood when grown in its own habita, but not as planted in the plains of Europe. P=376; stiffness 28/100 Oak; toughness 137-100 Oak; durability, very durable, II in its own habitat, containing turpentine but not resin, channels proper, takes a fine polish; Wt. 38-50; Av. 44; Rays, ff, very numerous; Pores none. *Uses.*—(Indigenous in Algeria, introduced into France from Asia Minor, the Taurus and North Africa), constructions wood (Mathieu).

23. WALNUT (Exotic) (130′×5′) (Fr. Noyer commun—Juglans regia). Grey deepening to brown towards centre, veined and flushed with black and red tints; moderately hard, homogeneous; durability, fairly durable, III, but almost always used under cover and away from moisture · P=449; stiffness 49-100 Oak; toughness 111-100 Oak; Wt., 36-50; Av. 43; Rays f; Pores 1-m. *Uses.*---(Introduced from Persia and North India), Cabinet-work, joinery, gun-stocks, carriage-panels, turning, inlaying, fancyware. (Mathieu); Highly esteemed for furniture, veneer, gun-stocks, and for frames, wood-carving and turning (Schlich).

24. ELDER (30′×1′) (Fr. Sureau noir---Sambucus nigra). Uniformly light yellow, dull; moderately hard; durability, not durable except under cover and away from moisture; IV; Wt. 34-43; Av. 38; Rays m; Pores s. *Uses.*---Small turned articles and fancy ware, such as combs, etc. (Mathieu).

Under 1 foot diameter.

Berberis vulgaris (Barberry; Fr. E'pine-vinette) (SH. 6′). *Uses.*—Inlaying. Rhus continus (Sumac; Fr. Sumac fustet). (SH.). *Uses.*---Small fancy-ware.

C.—White.

25. EVERGREEN or ITALIAN, CYPRESS (Exotic) (75′ × 2′) (Fr. Cypres pyramidal-Cupressus (sempervirens). White or faintly tinted with yellowish brown, scented; moderately hard, homogeneous; Durability, very durable II, especially under water, works easily; Wt. 38–40; Av. 39 m; Rays ff, very numerous; Pores none. *Uses.*—(Introduced from Asia). Much esteemed for carpentry and joinery, very good vine-props (Mathieu).

26. BIRCH (75′ × 2′) (Fr. Bouleau blanc---Betula alba). Uniformly white; moderately hard; durability, not durable I under atmospheric variations decays rapidly and completely, shrinks much in drying; Wt. 32-49; Av. 38; Rays f, without silver-grain; Pores m. *Uses.*—Never for construction, but for joinery, wheel-wrightery, turning, cabinet-work (root-wood and excrecent boles), ladders, sabots, hoops, faggot-ties (Mathieu). Joinery, furniture, wheel-wrights' work, turning, bobbins, clogs, wood-carving, brushes, shoe-pegs, coarse carved wares, withes, brooms (two last from branchlets); figured BIRCH wood is much prized by the cabinet-makers, (Schlich).

III.—HARD.

Under 1 *foot diameter.*

Corylus avellana (Hazel; Fr. Coudrier noisettier) (Sh. 12′). *Uses.*—Poles, props, sieve-frames and cabinet-work.

A.—Reddish.

27. YEW (45′ × 5′) (Fr. If commun—Taxus baccata).

Sapwood small yellowish white, heartwood Chestnut red veined with brown; hard, homogeneous, one of the most tenacious and compact woods of the forests, without resin ducts; Durability, durable II, polishes well and retains it long; Wt. 42–56; Av. 49; Rays ff, very numerous: Pores none. *Uses.*—Turning, sculpture,

instruments, toys, when stained black makes a good substitute for Ebony (Mathieu); esteemed for bows, cabinet-making, wood-carving and turnery (Schlich).

28. CORSICAN, OR AUSTRIAN, PINE (140′ × 5′) (Fr. Pin Laricio-Pinus Laricio) Sapwood large white, heartwood Rosy red to Red brown with numerous resin ducts filled with turpentine that often make the wood translucent like horn; Hard, but brittle from excessive resin and wanting in elasticity, Durability, similar to the better qualities of SCOTCH FIR (see 18) II, but shrinks in drying, very difficult to work; 32–56; Av. 44; Rays ff, very numerous; Pores none. *Uses.*—Too brittle and full of resin for construction or carpentry, serves for planking and side-plates Arsenals and good sleepers (Mathieu); More used for hydraulic and earthworks than for superstructure; furniture (Schlich).

29. MARITIME, OR STAR, OR CLUSTER, PINE (90′ × 4′) (Fr. Pin maritime-Pinus pinaster) Sapwood White, heartwood light red to Red brown, more or less deep, with numerous large reddish brown longitudinal streaks (resin ducts); Hard; Durability, durable II, and still more so if tapped for resin (countrary to the effect of most Pines); 33–48; Av. 40; Rays ff, very numerous; Pores none. *Uses.*—Secondary uses in naval construction, carpentry, sleepers, telegraph-poles, pides vine-props, tops and bottoms of double casks, slats for packing cases (Mathieu).

30. STONE OR ITALIAN PINE (90′ × 6′) (Fr. Pin pinier-Pinus pinea) Sapwood white, heartwood light Red to Red brown, more or less deep, with large Red brown longitudinal streaks (resembles, and difficult to distinguish from 29. MARITIME PINE, but resin ducts less numerous); Hard Durability, durable II, but less resinous than last; 35–48; Av. 41; Rays ff, very numerous. *Uses.*—First class carpentry, masts and side-planking for marine building, and excellent for joinery (Mathieu).

31. BEECH (120′ × 6′) (Fr. Hêtre commun-Fagus syluatica) White when fresh cut becoming light Red on exposure and in old trees brownish Red towards the centre with irregular veining; Hard, wanting in suppleness; Durability, very poor IV to V soon insect-eaten, and lasts very short while when subject to alternations of dry and moisture, but fairly durable under water or in places perpetually wet, warps and cracks easily, works easily but does not polish well; (P = 108; Stiffness = 77; Toughness = 108; Wt. 43–57; Av. 50; Rays Biform b-ff, few many giving a conspicuous silver-grain; Pores m-s. *Uses.*—Not a construction wood, but largely employed for industrial purposes, by wheel wrights for wheelspokes, by coopers, joiners, mechanicians, turners, sabotmakers, treated it makes good sleepers and wood-paving (Mathieu); joinery for floors and stair-cases, mills and mines (stamping hammers), railway sleepers, wood paving-blocks, cabinet-making, for bentwood furniture pianos, carpenters' benches, wheel wrights' work, slack barrels, agricultural implements, packing cases, coarse carved work, wooden shoes, horse-collars, gun stocks, brushes, etc. (Schlich).

32. ALMOND (Exotic) (35′ × 1′) (Fr. Amandier commun-Prunus amygdalus) Sapwood White scanty, heartwood deep chestnut Brown veined, spring-wood more deeply coloured, with White mottling from rays; Hard rough full; Durability, durable III, but very liable to crack and warp, takes a good polish; Wt. 59–71; Av. 65; Rays b, white giving a good silver-grain; Pores m-s. *Uses.*—(Introduced from the Levant), Inlaying (Mathieu.)

33. WHITE MELBURRY (Exotic) (50′ × 4½′) (Fr. Murier blanc-Morus albus) Pale Yellow becoming Orange to reddish Brown, very similar in structure (but far superior in colouring and qualities) FALSE ACACIA (see 45); Durability, durable III, shrinks in drying, works well and takes good polish; Wt. 36-49; Av. 42; Rays m; Pores

less, all sizes. *Uses.*—(Introduced from China), Coopers' work, Turnery-ware, wheelwrights' work, vine-props, trenails for naval work (Mathiew).

34. PLANE TREE (Exotic) (110′ × 10′) (Fr. Platane d'Orien-Platanus orientalis).—Resembles the BEECH (see 31) but browner; hard; P=558; stiffness=78; toughness=108; durability, IV, has all the defects, as well as the qualities, of BEECH (see 31), but less subject to decay in damp places; wt. 40-49, av. 44; rays m, all equal numerous giving a good silver-grain; pores m-s. *Uses.*—(Introduced from Greece and Afghanistan and the variety "occidental" from N. America), used precisely in the same way as BEECH (see 31) (Mathieu).

35. PLUM (35′ × 1′) (Fr. Prunier commun—Prunus domestica). Red-brown veined and shaded with crimson and violet-red, colours are brightened with lime water; hard and fine-grained; durability, fairly durable III, when not exposed to alternations of dry and moisture nor to atmospheric changes; wt.—49, 55, av. 52; rays m, with fair silver-grain; pores m-s. *Uses.*—(Probably exotic and origin unknown, but never found in the forest), turning, small fine cabinet-work and inlaying (Mathieu).

36. CHERRY (70′ × 2′) (Fr. Cerisier Merisier—Prunus cerasus). Sapwood white or pale, heartwood light red-brown veined (immediately after felling it becomes an ochreous-red) steeped in lime water or weak nitric acid for two or three days it becomes bright red like mahogany (see 42—bis); hard but not quite so as plum (see 35), and tenacious; durability, IV-V, decays rapidly in the air, but fairly durable when not exposed to atmospheric changes or alternations of dry and damp, polished well; wt. 34—49, av. 42; rays f, without much silver-grain; pores s. *Uses*—cabinet-work, joinery, furniture especially chairs and settees, turning, musical (wind) instruments, toys, and (when young) hoops

(Mathieu); esteemed by cabinet-makers and turners, and used by wheel-wrights (Schlich).

37. LOCUS BEAN, CAROB, or ALGAROBA (Exotic) (60′ × 3′) (Fr. Carnoubier commun—Ceratonia siliqua).—Sapwood yellowish white fairly copious, heartwood bright pink veined; hard, fissile; durability—deteriorates rapidly under conditions of humidity V, polishes well; wt. 52—57, av. 54; rays ff, very numerous; pores m. *Uses*—(Introduced from the East Asia Minor), split wood (staves, etc.) esteemed for wheel-wrights' work, joinery, and cabinet-work (Mathieu).

38. ARBUTUS, or STRAWBERRY TREE (15′ × 1′) (Fr. Arbousier, Arbre à fraise—Arbutud unedo).—Uniformly reddish with, sometimes, crimson and brown tints; hard, brittle and short-fibred; durability, very poor V, warps much but easy to work and takes a fine polish; wt. 49—63, av. 56; rays ff, without silver-grain; pores ss. *Uses*—small turned and inlaid articles, fancy goods and toys (requires to be quite dry) (Mathieu).

39. TORMINAL, or TORMINAL SERVICE (45′ × 1½′) (Fr. Alisier torminal—Pyrus torminalis).—Reddish and often flushed with black-brown towards centre, except for colouring has the structure of WHITE SERVICE (see 59); hard tenacious very homogeneous; durability—used only under cover in dry places, shrinks very little (2%) in drying, works well and receives good polish; wt. 41—62, av. 52; rays ff; dores ss. *Uses*—by wood-engravers, turners, mechanic ians for tools and parts of machines subject to friction, and makers of instruments (Mathieu).

40. MOUNTAIN ASH, or ROWAN (40′ × 1⅓′) (Fr. Sorbier des oiseleurs—Sorbus aucuparia).—Reddish-white becoming red or reddish-brown towards centre, satiny; hard tenacious; durability—only durable, and only used in dry places under cover V; wt. 43—49, av. 46; rays ff; pores ss (microscopically larger and closer in the spring wood). *Uses*—for turning and manufacture of

tools and parts of machinery subject to friction (Mathieu) splendid wood for wheelwrights' work on account of its great toughness (Schlich).

41. PEAR (45′ × 3′) (Fr. Peirier commun—Pyrus communis).—Uniformly red, less brightly coloured towards the centre than the APPLE (see 42); hard compact, very homogeneous; durability—durable (and used) only under cover and in dry places IV, works easily and receives a fine polish, but shrinks to ⅙ of its volume, and is liable to warp and to crack, and can only be used when quite dry; wt. 44—52, av. 48; Rays ff; pores sss; *uses*—after the BOX (see 65) and SERVICE (see 63), the most esteemed wood for wood-engraving, in great demand by sculptors, turners, cabinet-makers, musical instrument makers, and mathematical (scales, T-squares, triangles, etc.) instrument makers; takes black well and forms a substitute for ebony (Mathieu); highly esteemed for cabinet-making and turnery, for picture-frames, blocks for woodcuts; figured wood prized for veneer (Schlich).

NOTE.—Gamble describes the PEAR (see 41) and APPLE (see 42) as soft woods; this is quite opposed to Mathieu, and to the spirit of the purposes for which they are utilized. Mathieu says:—"The woods of the very natural family of the Pomaceae which comprise (Cotoneaster, in the Indian list), HAWTHORN, PEAR, APPLE WHITE SERVICE TORMINAL, MOUNTAIN-ASH SERVICE, all herein referred to present great resemblance, and are very difficult to distinguish specifically or even generically. Hard, heavy, very homogeneous woods, non-fissile, with little or no silver-grain, white or light red often flushed towards the centre with red-brown or even black-brown, and without clear distinction between the heart and sapwood. They have analogies with the Amygdalaceæ. PEACH, ALMOND, PLUM, etc.—but it is easy to see the smaller pores and the finer rays. In forest language the Pomaceae are known as fruit Trees."

42. APPLE (35′ × 1′) (Fr. Pemmier acerbe, Pemmier commun—Pyrus malus) wood very closely allied to the PEAR (see 41) but pores slightly larger and more numerous, red veined and flushed with red-brown towards the centre; hard, with other qualities like, but to a less degree than, the PEAR (see 41); durability,

durable (and used) only under cover and in dry places IV, more liable to crack and warp; Wt. 50—54; Av. 52; Rays ff; Pores ss. *Uses.*—Same as PEAR (see 41), but to a less degree (Math). Under 1 foot diameter:—*Uses.*— Prunus mahaleb (Mahaleb Cherry; Fr. Cerisier mahaleb) (t. 30′×4″). Small turning and cabinet-work.

Rhamnus catharticus (Buckthorn; Fr. Nerprun purgatif) (t. 25′×6″). *Uses.*—Small turning and inlaying work.

Cornus sanguinea (Blood Cornel, Bugwood; Fr. Cornouiller sanguin) (S.H. 15′). *Uses.*—Basket-frames, tool handles, small pieces of machinery, ladder-rungs, fork handles, poles, walking sticks.

42-*bis*. MAHOGANY (Exotic) (100′ × 5″) (Fr. Acajou-Swietenia Mahagonia). Heartwood reddish-brown, sap-wood paler; hard; durability, very durable II, seasons well and takes good polish; P=Spanish 407; Honduras = 583; Stiffness Sp. 75; Hon. 93; Toughness Sp. 61, Hon. 99; Wt. 35—55; Av. 45; Rays m, very numerous giving good silver-grain; Pores m. *Uses.*—(Imported from Honduras, Cuba, Mexico and Jamaica), most extensively used (perhaps more than any other wood) for high grade furniture, also for ship-building (chiefly planking), panelling, ornamental fittings, and cabinet-ware generally (Brandis, Gamble).

NOTE.—This tree is not grown in France, but it is one of the recognized timbers of Europe, and one for which India can afford good substitutes.

B.—Yellow to Yellowish-brown.

43. ALEPPO PINE (60′×3½′) (Fr. Pin d'Alep-Pinus halepensis). White to tawny yellow-brown irregularly towards centre, with large resin ducts filled with resin that sometimes become translucid; hard; Durability, considerable II due to the resin contained, but a wood of medium quality only; Wt. 33—54, Av. 43; Rays ff, very numerous; Pores none. *Uses.*—Small carpentry,

common joinery, in construction as piles, railway sleepers, boat planking; but chiefly for strong packing cases and casks for dry goods (Mathieu).

44. OAK (175′ × 20′) (Fr. Chêne-Quercus robur).

NOTE.—Formerly considered as to species—Peduncled OAK or White OAK, Fr. Chêne pédonculé; and Sessile OAK, or Black OAK, Fr. Chêne rouvre—now amalgamated into one; the difference in the timber is due rather to the conditions of growth than to anything else, and this the timber very variable. Mathieu says:—"Normally speaking, the Peduncled OAK is grown chiefly as standards over Coppice in fertile soil in the plains, and is more fibrous, rougher, more knotty, stronger, darker, and more suitable for construction than the Sessile OAK which is chiefly grown in high forests on low hills and plateaux and is straighter fibred, softer, more fissile, rather lighter coloured, and which is more suitable for split wood and industrial purposes. But these are less intrinsic in the species themselves than due to the very variable conditions under which they are developed."

Sapwood White considerable, heartwood light or dark tawny Yellowish brown occasionally with a Reddish tinge; Hard, elastic, strong, but none of these qualities in excess; Durability, sapwood rapidly attacked by insects in dry, by decay and fungi in damp, places ("for no species is the difference in the sapwood and the heartwood more pronounced than in the OAK," Mathieu), heartwood durable under all conditions Pedunculate, OAK II when grown in the open in a mild climate and on a moist but not wet soil, otherwise III; Sessile OAK II when used solely in dry places, but IV when exposed to damp; P=607; Stiffness=100, Peduncled: Sessile: : 167: 149; Toughness=100, Ped.: Ses.: : 81: 108; Wt. Ped. 40—57, Av. 48, Ses. 36—54, Av. 45, Average of both 47; Rays b, giving a beautiful silver-grain; Pores II-ss, all sizes, largest in the spring, smallest in the autumn; *Uses.*—"The timber of OAK is not in the first rank for any of the properties which distinguish its woody composition; it is neither the heaviest, nor the hardest, nor the most elastic, nor even the strongest of woods; but it unites all these qualities in such measure, it has such durability either in air or under water, it can acquire

such dimensions, that without contradiction it is the most precious of all *that* our (French) forests produce, and that amongst exotics, there are few that can equal it in the uses for which it is employed. It is par excellence the timber for naval, civil, hydraulic and military constructions; it furnishes factories with bed-plates or motors and all the pieces of machinery that demand strength and durability; it gives the best railway sleepers, and its rareness and high price are what cause other species which it is necessary to inject with preservative compositions before putting down—to be substituted in its place. Wheelwrightery and joinery utilize it in numerous ways spokes, flooring, furniture; cabinet-work demands a large proportion of it in the form of planking cut to the silver-grain; cooperage consumes large quantities in the form of staves; agriculture constructs the greater part of its ploughing implements of it; and finally, poles and props, laths, trellies, etc., are made from it (Mathieu); used (? purchased), and sawn up later into beams and scantlings, in logs and baulks for superstructures, hydraulic works, bridges, ship and boat building, gate-posts as scantlings and boards for mill-wheels, railway sleepers, mining timbers, joiners' work, cabinet-making; for wheelwrights' work, staves, bungs, sieve-frames, shingles, trenails, wood-carving, pianoforte-making turnery, window-frames, park-palings, vine-stakes, hurdles, etc. It should be noted that the fine-zoned easily-worked softer wood of the Sessile OAK is preferred to that of the Peduncled OAK for all purposes making less demand in size, hardness, strength and durability. The latter is preferable for constructions of all kinds, for stave, wheelwrights' work, split wood, etc. (Schlich).

45. FALSE ACACIA (80′ × 3′) (Exotic) (Fr. Robinier faux-Acacia.—Robinia pseudacacia) Sapwood white small, heartwood Yellow to Greenish yellow, shining; Hard, fibrous, elastic, one-third stronger transversely

than OAK (see 44); Durability, as durable as OAK II to III, works well and polishes well; Wt. 41-49, Av. 45; Rays m; Pores II-ss, all sizes, largest in the spring wood and smallest in the autumn wood; *Uses.*—(Introduced from N. America), not regular nor large enough for construction; first class for spokes in wheelwrightery; preferred above all others for vine and other props, hoops, marine trenails, flooring in joinery, furniture, turning, etc., more valuable than the OAK (see 44), ELM (see 46), ASH (see 53) (Mathieu); wheelwrights' wood, implements, joinery, trenails, vinestakes, tool handles, turnery (Schlich).

46. ELM (150′ × $7\frac{1}{2}$′) (Fr. Orme champêtre Ulmus campestris) Sapwood yellowish white fairly copious, heartwood orange brown; Hard, very tenacious, elastic, non-fissile; Durability, sapwood liable to be worm-eaten, heartwood as durable as OAK (see 44 III, especially if used in damp places, such as, caves, wells, mine-galleries, II, slow to dry and shrinks, warps and cracks; P = 497; Stiffness = 78; Toughness = 86; Wt. 38-53, Av. 46; Rays m-f, giving a silver-grain; Pores II-ss, all sizes, largest in the spring, smallest in autumn, wood. *Uses.*—Well and mine timber, felloes and naves of wheels construction of machines, gun-carriages; figured wood from excrescences by repeated lopping by cabinet-makers, turners and gun-makers (Mathieu); used by the furniture-makers, undertakers (coffins especially), and turners; greatly in demand by wheelwrights (Schlich).

47. CHESTNUT (100′ × 1′) (Fr. Chataigner commun—Castanea vesca) Sapwood white scanty, heartwood the same colour as OAK (see 44) light or dark tawny yellowish brown occasionally with a reddish tinge; Hard, elastic, strong and readily fissile; Durability, durable under shelter II, less so under ground III, decays rapidly under alternations of atmospheric influences or dryness and damp, has a great disposition to rot at the pith and large sound scantlings are difficult to obtain;

P. 416; Stiffness 54; Toughness 85; Wt. 34—46, Av. 40; Rays ff, without silver-grain; Pores II-ss, all sizes as in OAK (see 44); *Uses.*—Principally split wood, excellent staves; vine-props, cask hoops; small scantlings for construction (Mathieu); used sometimes in superstructures, also for furniture, park-palings, staves, makes excellent vine stakes and hop-poles (Schlich).

48. Laburnum (30′ × 1′) (Fr. Cytise faux-ebenier—Laburnum anagyroides) Sapwood white or yellowish scanty, heartwood yellowish brown with black and green tints, shining; Hard, very elastic; Durability, durable III, but so small and uncommon that it can only be used for small purposes under shelter in small quantities, takes very fine polish; Wt. 44—51, Av. 47: Rays ff; Pores II ss; *Uses.*—Turners, cabinet-makers (Mathieu).

49. MASTIC (45′ × 2′) (Fr. Pistache terebinthe—Pistacia terebinthus) (20′ × 1¾′) (Fr. Pistache lentisque—Pistacia lentiscus).

NOTE.—Two rather small, not common, species, differing slightly in colour, otherwise nearly similar, and used for similar purposes.

Sapwood white or yellowish white fairly copious, heartwood either chestnut brown (in the large species) or salmony orange and satiny (in the smaller); Hard, compact; Durability, used only under cover; Wt. 47—55, Av. 51; Rays f; Pores Biform m ss; *Uses.*—Cabinet-work, turning, inlaying, sculpture and fine small joinery (Mathieu).

50. EVERGREEN BUCKTHORN (25′ × 1¼′) (Fr. Nerprun alaterne—Rhamnus alaternus) Sapwood yellowish white, heartwood light Oak to deep Chestnut brown, more or less veined; Hard, very homogeneous, brittle; Durability, used only under cover, shrinks; Wt. 50—72, Av. 61; Rays f; Pores s; *Uses.*—Turning, inlaying, and small cabinet-work (Mathieu).

51. AFRICAN MAHOGANY (35″ × 1¾′) (Fr. Jujubier ommun, Acajou d'Afrique—Zizyphus vulgaris) Sapwood

yellowish, heartwood orange to bright red; hard, compact; durability, used only under cover, takes fine polish; Wt. 59—70, Av. 65, Rays ff; Pores ss. *Uses.*—Cabinet-work (Mathieu). Under 1 foot diameter:—Euonymus europæns (Spindle Tree; Fr. Fusain d'Europe) (20′ × ½′). *Uses.*—Turning, and substitute for "Box".

C.—White or Pale tinted.

52. NETTLE TREE (60′ × 3′) Fr. Micocoulier de Provence—Celtis australis)—Uniformly white greyish or greenish white, resembles ASH (see 53) but has not the satiny lustre; hard, very strong and very elastic and tenacious, with all the qualities of ASH (see 53) represented (except lustre) to a higher degree; durability, durable III and but little worm-eaten, warps little, shrinks 18% in drying, but decays somewhat when exposed to alternations of weather or of dry and moisture; Wt. 38—49, Av. 44; Rays b-f, scattered; Pores ii-ss, all sizes. *Uses.*—All usages requiring suppleness and tenacity; first class for oars and sculls, marine trenails, hoops, props gun-stocks, forks, whip-handles; excellent wood for wheelwrights, turners, sculptors, musical (wind) instrument makers, joiners, etc. (Mathieu).

53. ASH (100′ × 3′) (Fr. Frene commun—Fraxinus excelsa) white or pinkish white sometimes tinged with brown towards centre, with pearly silky or satiny lustre, unctuous to the touch; hard, very elastic and tenacious; durability; superior to BEECH (see 33) or HORN-BEAM (see 54), and durable III under cover (for construction or agricultural implements) but liable to decay especially if subjected to alternations of dry and moisture, little liable to be worm-eaten, warps but little; P=721; Stiffness 89; toughness 169; Wt. 39—63, Av. 52; Rays ff; Pores ii-ss, all sizes. *Uses.*—All purposes for which elasticity and toughness are required, much commoner

and therefore much more used than NETTLE TREE (see 52); wheelwrightery, coach-shafts, beams, and spokes, cart-shafts; oars and sculls, cask-hoops; joinery; constructions under cover; figury wood (from pruning) is used for turning and for planking in cabinet-making (Mathieu); for pillars, stamping-hammers, wheelwrights' work, joinery, implements, tool and whip-handles, hurdles, barrel-hoops, gymnastic apparatus, lance-shaft rudders and oars; figured ASH-WOOD is in great demand for furniture. (Schlich).

54. HORNBEAM (60′ × 1½′) (Fr. Charme commun—Carpinus betula).—Uniformly white always with wavy annual rings; hard, homogeneous, compact, tenacious, often with interlaced fibers; durability, very poor V, very difficult to work; Wt. 50-56, Av. 53; Rays Biform b false, fairly numerous; f. Pores s. *Uses.*—Not used for construction nor industrial work; but its hardness, weight, toughness, and homogeneity make it valuable for parts of machinery subject to friction, cog-wheel teeth, cams, etc.), and the manu- facture of tools (Mathieu); wheelwrights' work, in mills, machinery, turnery, shoemakers' pegs and lasts, plane-boxes, carpenters' benches, tool-handles, agricultural implements, etc. (Schlich).

55. MAPLE (45′ × 4′) (Fr. E'rable champêtre—Acer campestris).—Uniformly white with a faint tinge of yellow or red, or occasionally flushed with a brown tint towards centre in old trees, shining with satiny lustre; hard, very tenacious or tough, very homogeneous and compact; durability, only suitable under cover IV, decays rapidly under atmospheric variations, little liable to be worm-eaten or to warp or crack, takes a good oplish; Wt. 37-51, Av. 44; Rays f-ff, giving a fair silver-grain; Pores s-ss. *Uses.*—No use for construction, but in great demand for industrial purposes owing to

its toughness; handles of tools and wips; by gunsmiths, by wheelwrights, by joiners, by musical (wind) instrument makers, and by turners (Mathieu); esteemed by the cabinet-maker for solid and veneered articles, parquetry, etc., by the turner and carver, for articles made by the compass saw, churns, musical instruments, gunstocks and ornamental whip-handles. Figured Sycamore (see 56) and "Bird's eye" MAPLE—from knotty and excrescence wood—are very valuable (Schlich).

56. SYCAMORE (120′ × 6′) (Fr. E'rable sycamore—Acer pseudoplatanus). White without lustre; hard, less compact than MAPLE (see 55); durability, only suitable under cover IV, decays rapidly under atmospheric variations, little liable to be worm-eaten or to warp or crack; P. 491; Stiffness = 59; Toughness = 111; Wt. 36-46, Av. 41; Rays m-ff, more unequal, and giving a better silver-grain, than in MAPLE (see 55); Pores s, somewhat larger than in MAPLE. *Uses.*—By joiners, mechanicians, turners, musical instrument (wind) makers, and sabot-makers (Mathieu); same as for MAPLE (Schlich).

57. NORWAY MAPLE (80′ × 5′) (Fr. E'rable plane—Acerplatanoides). White with often a pink tinge, never so pure a white as the SYCAMORE (see 56) which otherwise it resembles; hard, resembling the MAPLE (see 55); durability, more liable to insect-attack than MAPLE and SYCAMORE, otherwise the same IV; Wt. 35-51, Av. 43; Rays f-ff, giving a fair silver-grain; Pores s-ss. *Uses.*—Same as for SYCAMORE (see 56) but not so much in demand (Mathieu).

58. HOLLY (30′ × 1½′) (Fr. Houx commun—Ilex aquifolium) Uniformly white, getting brown towards centre when deteriorating; hard, very homogeneous and compact; durability, only durable when kept dry, IV, but not liable to be worn-eaten, warps and cracks but little; Wt. 46-60, Av. 53; Rays m, fairly numerous giving good silver-grain; Pores ss. *Uses.*—No use for

construction, but in demand for industrial purposes; cog-wheel teeth, tools, inlaying and turning, cabinet-work in relief, walking-sticks, takes black well and polishes well thereafter and is a substitute for Ebony (Mathieu).

59. WHITE SERVICE (40′ × 1½′) (Fr. Alisier blanc—Pyrus aria) Uniformly white, or in old age becoming pinkish with a tinge of brown towards centre; hard, very homogeneous, non-fissile; durability, used only under cover in dry places IV, works well and receives good polish; Wt. 46-59, Av. 53; Rays ff, without silver-grain; Pores ss. *Uses.*—Turning, and to make tools and parts of machinery subject to friction (Mathieu). Under one foot diameter.

Crataegus monogynum (Hawthorn, May; Fr. Aubepine monogyne) (30′ × 1′). *Uses.*—Turning and parts of machinery subject to friction.

VERY HARD OR EXTREMELY HARD

A.—Reddish.

60. HOLM OAK (50′ × 3′) (Fr. Chêne yeuse—Querecus Ilex).—Sapwood not distinct from heartwood which is light red passing more or less suddenly, in old trees, into the brown of an old OAK (see 44); extremely hard and compact, very homogeneous; durability, very durable II, but liable to warp and crack whilst drying, but this can be largely obviated by leaving it in water previously for some time, receives and retains a polish like marble; Wt. 56-74, Av. 65; Rays bbb, giving a beautiful silver-grain; Pores ss, practically equal in size unlike other OAKS. *Uses.*—A superb planking for cabinet-making, but requires suit-appliances for cutting it (Mathieu).

61. TURKEY OAK (75′ × 2½′) (Fr. Chêne chevelu—Quercus cerris).—Sapwood yellowish white, heartwood deep fawn yellow tinted with pink, sometimes veined

with brown; very hard, very fibrous, nearly non-fissile Durability, sapwood very liable to be worm-eaten, heartwood as in OAK (see 44) durable under all conditions II-III, less so when exposed to damp than under dry conditions, but very apt to split; Wt. 53–62; Av. 58; Rays m, narrower than in OAK (see 44), but very numerous and close giving a strongly coloured silver grain; Pores 11-ss, all sizes as in OAK (see 44). *Uses.*—Naval construction, small carpentry, vine-props (Mathieu).

62. MONTPELLIER MAPLE (45′×1′) (Fr. E'rable de montpellier—Acer monspelliensis).—Uniformly but distinctly red, otherwise like MAPLE (see 55); very hard and very tough and compact; durability, similar to MAPLE (see 55); Wt. 53–63; Av. 58; Rays f-ff, with fair silver-grain; Pores s-ss. *Uses.*—Turning and joinery (Mathieu).

63. SERVICE (60′×4′) (Fr. Sorbier domestique—Pyrus sorbus.—Reddish brown; very hard, one of the most compact and homogenous of the French woods; durability, durable but always used under cover; Wt. 51–59; Av. 55; Rays ff; Pores ss. *Uses.*—Wood-engravers, sculptors, turners, gunsmiths, mechanicians, cabinet-makers all require it; first class for making tools for joinery and cabinet work such as large jointer and common planes, and the demand is greater than the supply in spite of the high prices paid (Mathieu). *Under* 1 *foot diameter*:—Prunus spinosa (Blackthorn, Sloe; Fr. Prunier èpineux (Sh. 12′). *Uses.*—Planking for inlaying.

Cornus mas (Dogwood, Cornel; Fr. Cornouiller male) (t. 25′×4″). *Uses.*—Tool handles, small parts of machines, props, ladder-rungs, hoops, walking-sticks, poles, forks, skewers, etc.

B.—Yellow to Yellowish brown.

64. OLIVE (45′×6′) but usually a shrubby tree) (Fr. Olivier d'Europe—Olea europæa).—Chamois- or Olive-yellow irregularly marbled with numerous interlaced

black-brown veins; extremely hard, one of the most compact and homogeneous woods that exists; durability, very great I-II, works well and takes a beautiful polish; Wt. 52–70; Av. 61; Rays ff, numerous; Pores s. *Uses.*—Very esteemed for cabinet-work, inlaying, sculpture, fancy work; and excellent for turning (Mathieu).

65. Box (20′×1½′ usually much less and often a small shrub only) (Fr. Buis commun—Buxus sem pervirens).—Yellow; very hard, very dense and very homogeneous; durability, very durable I-II, cuts very cleanly and takes beautiful polish, apt to crack and be knotty; P = 709; Wt. 57–73; Av. 65; Rays f; Pores ss. *Uses.*—Absolutely precious for engravers, fancy-ware makers, makers of instruments of all kinds (Mathieu); used for wood-engraving, spindles, turnery, flutes and other musical instruments, measures, shuttles, etc. (Schlich). The value of Box-wood at Bombay of suitable texture for the English market, of which latter we can judge from a few sample pieces, will depend principally upon the quality. Wood from 2–4 inches in diameter is required to be free from splits or cracks, otherwise, however free from knots and straight and round it may be, the value would not exceed from £1 to £2 per ton, whilst if free from splits, round and straight and with :—Not exceeding 1 knot per feet length the value would probably be £10 per ton. Exceeding 1 and not 2 per foot length the value probably be £7/10 per ton. Exceeding 2 and not 3 per foot length the value would probably be £5 per ton.

All knots or holes are counted as such however small. Wood 4 inches and upwards in diameter is preferred with one split rather than sound or than with more than one split, any splits after the first reducing the value on account of the additional waste in working the same; the value of round and straight (split) averaging :

Diameter, averaging per foot length.	One knot.	Two knots.	Three knots.
4″–5″	£6	£4/10	£3
5″–6″	£9	£6	£3
6″ and upwards	£12	£9	£4/10

If the splits are twisted more than 1 inch to the foot if small, 2 inches if medium, and 3 inches if large, all to

the foot length, the value is reduced one half. The above values will, of course, vary with the supply and demand for the various sizes and quantities. The most suitable texture of wood will be found growing upon the sides of mountains. If grown in the plains, the growth is usually too quick, and consequently the grain is too coarse; the wood of the best texture being of slow growth and very fine in the grain. It should be cut down in the winter, and, if possible, stored up at once in airy, wooden sheds, well protected from sun and rain, and not to have too much air through the sides of the shed, more especially for wood under 4 inches in diameter. The Box-wood must not be piled upon the ground, but be well skidded under, so as to be kept quite free from the effects of any damp in the soil. After the trees are cut down, the longer they are left exposed the more danger there is, of the wood splitting more than is absolutely necessary during the necessary seasoning before shipment to this country. If shipped green, there is great danger of the wood sweating and becoming mildewed during transit, which causes the wood afterwards to dry light and of a defective colour, and in fact renders it of little value for commercial purposes. There is no occasion to strip the bark off, or to put cowdung or anything else upon the ends of the pieces to prevent their splitting. Box-wood is the nearest approach to Ivory of any wood known, and will therefore probably gradually increase in value, as it, as well as the Ivory, becomes scarcer. It is now used very considerably in manufacturing concerns, but on account of its gradual advance in price, during the past few years, cheaper woods are, in some instances, being substituted. Small wood under 4 inches is used principally by flax spinners for rollers, and by turners for various purposes, rollers for rink skates, etc., and if free from splits is of equal value with the larger wood. It is

imported here as small as 1½ inches diameter, but the most useful sizes are from 2½—3½, and would, therefore, we suppose, be from 15 to 30 or 40 years in growing, whilst larger wood would require 50 years and upwards at least, perhaps we ought to say 100 years and upwards. It is used principally for shuttles for weaving silk, linen and cotton, and also for rule-making and wood-engraving. "Punch," "The Illustrated London News," "The Graphic," and all first class pictorial papers use large quantities of Box-wood (Gamble).

66. CORK OAK (40′ × 5′) (Fr. Chêne liege-Quércus suber).—Colour variable from yellowish grey or brownish to brown and even red-brown with no proper distinction of sapwood; Extremely hard, compact without being as homogeneous or fine-grained as Holm Oak (see 60) which it approaches, scarcely fissile; Durability, fairly durable III, but decays under alternations of dryness and moisture, and cracks both lengthily and broadly; Wt. 50–64; Av. 57; Rays bb, irregular; Pores ll-ss, all sizes but not so defined as in Oak (see 44); *Uses.*—Inferior scantlings for marine; joinery, and machine construction (Mathieu).

LIST OF TIMBER-GIVING TREES, SHRUBS AND CLIMBERS OF MADRAS PRESIDENCY.

Trees capable of attaining one foot or more in diameter.

Serial No.	Species.	Value class.	Category.
1	Dillenia indica	III	16
2	Dillenia bracteata	,,	16
3	Dillenia pentagyna	II	16
4	Michelia champāca	,,	28
5	Michelia nilagirica	,,	28
6	(Omitted.)		
7	Polyalthia coffeoides }	III	32
8	fragrans }		
9	Polyalthia cerasoides	,,	32

Serial No.	Species.	Value class.	Category.
10	Popowia Beddomeana	III	32
11	Mitrephora Heyneana	,,	32
12	Mitrephora grandiflora	,,	32
13	Xylopia parvifolia	,,	32
14	Miliusa velutina	,,	32
15	Saccopetalum tomentosum	,,	32
16	Alphonsea lutea	IV	32
17	Alphonsea zeylanica	,,	32
18	Alphonsea madraspatana	,,	32
19	Orophea erythrocarpa	,,	32
20 21	Sageraca laurina Dalzelii }	,,	32
22	Crataeva religiosa	,,	13
23	Capparis grandis	,,	53
24	Cochlospermum gossypium	V	1
25	Scolopia crenata	III	40
26	Flacourtia cataphracta	,,	40
27	Flacourtia Ramontchi	,,	40
28	Hydnocarpus Wightiana	,,	15
29	Hydnocarpus alpina	,,	50
30	Asteriastigma macrocarpum	IV	15
31	Tamarix gallica	,,	2
32	Garcinia indica	II	44
33	Garcinia cambogia	,,	44
34	Garcinia ehinocarpa	,,	44
35	Garcinia morella	III	44
36	Garcinia travancorica	,,	44
37	Garcinia xanthochymus	,,	44
38	Garcinia spicata	,,	44
39	Ochrocarpus longifolius	,,	44
40	Calophyllum inophyllum	,,	22
41	Calophyllum tomentosum	I	22
42	Calophyllum Wightianum	II	22
43	Mesua ferrea	I	57
44	Poeciloneuron indicum	II	44

Serial No.	Species.	Value class.	Category.
45	Poeciloneuron pauciflorum	III	44
46	Ternstroemia japonica	IV	19
47	Eurya japonica	"	2
48	Gordonia obtusa	III	45
49	Dipterocarpus indicus	II	17
50	Dipterocarpus Bourdilloni	"	17
51	Vatica Roxburghiana	I	49
52	Shorea talura	II	49
53	Shorea robusta	"	49
54	Shorea tumbaggaia	"	49
55	Hopea parviflora	I	49
56	Hopea Wightiana	"	49
57	Hopea glabra	II	49
58	Hopea racophloea	"	49
59	Vateria indica	"	17
60	Balanocarpus utile	III	49
61	Balanocarpus erosa	"	49
62	Kydia calycina	IV	11
63	Bombax malabaricum	III	11
64	Bombax insigne	V	11
65	Cullenia excelsa	III	4
66	Sterculia foetida	IV	11
67	Sterculia urens	"	2
68	Sterculia villosa	"	1
69	Sterculia guttata	"	1
70	Sterculia colorata	V	11
71	Sterculia alata	III	11
72	Heritiera littoralis	II	59
73	Heritiera papilio	"	59
74	Pterospermum suberifolium	IV	45
75	Pterospermum diversifolium obtusifolium } ...	"	45
76	Pterospermum rubiginosum	II	45
77	Pterospermum reticulatum	III	45
78	Pterospermum Heyneanum	"	45

Serial No.	Species.	Value class.	Category.
79	Pterospermum glabrescens	IV	4
80	(See above 75.)		
81	Berrya amonilla	III	45
82	Grewia excelsa	,,	45
83	Grewia salvifolia	IV	45
84	Grewia orbiculata	III	45
85	Grewia tiliaefolia	,,	45
86	(Omitted.)		
87	Grewia laevigata	IV	10
88	Grewia microcos	,,	10
89	Elaeocarpus Ganitrus	,,	10
90	Elaeocarpus serratus	,,	10
91	Elaeocarpus lanceaefolius	,,	10
92	Elaeocarpus oblongus	,,	10
93	Elaeocarpus amoenus	,,	10
94	Elaeocarpus tuberculatus }	III	10
95	aristatus		
96	Elaeocarpus rugosus	IV	10
97	Elaeocarpus ferrugineus	,,	10
98	Elaeocarpus Munronii	,,	10
99	Evodia Roxburghiana	,,	33
100	Zanthoxylum Rhetsa	,,	33
101	(Omitted.)		
102	Toddalia bilocularis	IV	53
103	Peronia elephantum	III	53
104	Ægle marmelos	,,	53
105	Ailanthus excelsa	IV	11
106	Ailanthus malabarica	,,	11
107	Boswellia serrata	,,	23
108	Garuga pinnata	III	20
109	Balsamodendron caudatum	IV	23
110	(Omitted.)		
111	Bursera serrata	III	36
112	Canarium strictum	,,	23
113	Filicium decipiens	I	61

Serial No.	Species.	Value class.	Category.
114	Azadirachta indica	II	36
115	Melia composita	III	20
116	Dysoxylum binectariferum	,,	20
117	Dysoxylum purpureum	II	36
118	Dysoxylum malabaricum	,,	50
119	(Omitted.)		
120	Aglaia Roxburghiana	II	61
121	Aglaia Maiae	III	61
122	Aglaia minutiflora travancorica ...	,,	61
123	Lansium anamallayanum	,,	55
124	Amoora Rohituka	,,	36
125	Amoora canarana	,,	36
126	Amoora Lawii	,,	36
127	Walsura piscidia	,,	61
128	Heynea trijuga	,,	50
129	Beddomea simplicifolia	IV	50
130	Carapa obovata	III	36
131	Soymida febrifuga	II	57
132	Chukrassia tabularis	,,	36
133	Cedrela toona	I	20
134	Chloroxylon swietenia	II	55
135	Strombosia ceylanica	III	38
136	Anacolosa densiflora	,,	38
137	(Omitted.)		
138	Apodytes Benthamiana	III	38
139	Apodytes Beddomei	,,	38
140	Ilex denticulata malabarica	IV	12
141	Ilex Wightiana	,,	12
142	Euonymus indicus	III	55
143	Euonymus dichotomus	,,	55
144	Microtropis ramiflora	IV	12
145	Lophopetalum Wightianum	II	20
146	(Omitted.)		
147	Pleurostylia Wightii	IV	38
148	Kurrimia bipartita	,,	15

Serial No.	Species.	Value class.	Category.
149	Elaeodendron glaucum	III	45
150	Zizyphus jujuba	„	68
151	Zizyphus xylopyra	„	40
152	Hemigyrosa deficiens	„	54
153	Hemigyrosa canescens	„	54
154	Erioglossum edule	„	41
155	Schleichera trijuga	I	41
156	Sapindus trifoliatus	IV	46
157	Nephelium longana	II	41
158	Nephelium stipulaceum	„	41
159	Harpullia cupanioides	IV	13
160	Turpinia pomifera	„	12
161	Meliosma Wightii	V	2
162	Meliosma simplicifolia	„	2
163	Meliosma Arnottiana	„	2
164	Mangifera indica	III	5
165	Gluta travancorica	II	64
166	Buchanania latifolia	III	5
167	Buchanania angustifolia	IV	5
168	Buchanania lanceolata	„	5
169	Solenocarpus indica	V	25
170	Odina wodier	III	25
171	Semecarpus anacardium	IV	7
172	Semecarpus travancorica	„	7
173	Semecarpus auriculata	„	7
174	Holigarna Arnottiana ... ... }	„	7
175	Holigarna ferruginea ... ... }		
176	Holigarna Grahamii Beddomei ...	„	7
177	Nothopegia Colebrookiana	„	25
178	Spondias mangifera	V	1
179	Spondias acuminata	„	1
180	Ougeinia dalbergioides	II	64
181	Erythrina stricta	IV	1
182	Erythrina suberoa	„	1
183	Buteafrondosa	III	11

Serial No.	Species.	Value class.	Category.
184	Dalbergia latifolia	I	64
185	Dalbergia sissoides	II	64
186	Dalbergia lanceolaria	IV	29
187	Dalbergia paniculata	„	31
188	Pterocarpus santalinus	II	57
189	Pterocarpus marsupium	„	63
190	Pongamia glabra	IV	29
191	Ormosia travancorica	„	29
192	Cassia fistula	III	62
193	Cassia marginata	„	62
194	Cassia siamea	„	62
195	Cassia timoriensis	IV	62
196	Cynometra ramiflora	III	61
197	Cynometra travancorica	„	61
198	Cynometra Beddomei	„	61
199	Cynometra Bourdilloni	„	61
200	Hardwickia binata	I	57
201	Hardwickia pinnata	II	36
202	(Omitted.)		
203	Tamarindus indica	II	53
204	Humboldtia Brunonia	IV	21
205	Humboldtia Vahliana	„	21
206	Humboldtia decurrens	„	21
207	Bauhinia recemosa	„	21
208	Bauhinia malabarica	III	21
209	Bauhinia retusa	IV	21
210	Bauhinia purpurea	„	21
211	Bauhinia variegata	„	21
212	Xylia dolabriformis	I	63
213	(Omitted.)		
214	Prosopis spicigera	III	53
215	Acrocarpus fraxinifolius	II	20
216	Acacia planifrons	III	40
217	Acacia arabica	II	38
218	Acacia leucophlœa	III	40

Serial No.	Species.	Value class.	Category.
219	Acacia suma	II	58
220	Acacia catechu	"	58
221	Acacia ferruginea	"	58
222	Albizzia lebbek	III	47
223	Albizzia Thompsoni	"	47
224	Albizzia odoratissima	"	47
225	Albizzia procera	"	47
226	Albizzia stipulata	"	6
227	Albizzia amara	II	47
228	Pithecolobium umbellatum	IV	6
229	Pithecolobium bigeminum	"	6
230	Pithecolobium subcoriaceum anamallayanum	"	6
231	Pygeum Wightianum	III	36
232	Fygeum Gardneri	"	36
233	Carallia integerrima	"	16
234	Blepharistemma corymbosum ...	"	9
235	Terminalia belerica	"	48
236	Terminalia chebula	"	60
236	(bis) Terminalia travancorensis ...	"	48
237	Terminalia Arjuna	II	47
238	Terminalia tomentosa	"	47
239	Terminalia pallida	III	60
240	Terminalia paniculata	"	48
241	Anogeissus latifolia	II	60
242	Anogeissus acuminata	III	48
243	Gyrocarpus Jacquini	IV	11
244	Eugenia Munronii mundagam ...	III	43
245	Eugenia aquea	IV	43
246	Eugenia Beddomei	III	43
247	Eugenia hemispherica	II	43
248	Eugenia laeta	IV	43
249	Eugenia cylindrica	III	43
250	Eugenia Arnottiana	II	43
251	Eugenia Wightiana	III	43

Serial No.	Species.	Value class.	Category.
252	Eugenia zeylanica	III	43
253	Eugenia montana	,,	43
254	Eugenia Gardneri	II	43
255	Eugenia corymbosa	III	43
256	Eugenia utilis	,,	43
257	Eugenia revoluta	,,	43
258	Eugenia Myhendrae	,,	43
259	Eugenia Neesiana	,,	43
260	Eugenia calophyllifolia	,,	43
261	Eugenia rubicunda	,,	43
262	Eugenia malabarica	,,	43
263	Eugenia alternifolia	,,	43
264	Eugenia operculata	II	43
265	Eugenia Stocksii	III	43
266	Eugenia jambolana	II	43
267	Eugenia floccosa	III	43
268	Eugenia bracteata var. Roxburghii ...	IV	55
268	(bis) Eugenia Mooniana	III	55
269	Barringtonia racemosa	V	11
270	Barringtonia acutangula	III	19
271	Careya arborea	,,	40
272	Memecylon edule and other sp. ...	,,	55
273	Lagerstroemia parviflora	II	62
274	Lagerstroemia lanceolata	,,	37
275	Lagerstroemia flos-Reginae	,,	37
276	Sonneratia apetala	III	43
277	Sonneratia acida	IV	15
278	Casearia esculenta	III	34
279	Homalium nepalense	IV	34
280	Homalium tomentosum	II	40
281	Homalium zeylanicum	,,	40
282	(Omitted.)		
283	Tetrameles nudiflora	III	11
284 285 286	(Omitted—second list.)		

Serial No.	Species.				Value class	Category.
287	Mastixia arborea	...	...	...	IV	9
288	Mastixia pentandra	...	...	...	,,	9
289	Viburnum punctatum (acuminatum)			...	,,	38
290	Sarcocephalus missionis		...	...	,,	9
291	Anthocephalus cadamba		...	...	III	9
292	Adina cordifolia	...	...	...	II	9
293	Stephegyne parvifolia	...	...	...	III	9
294	Stephegyne tubulosa	...	...	...	,,	9
295	Nauclea purpurea	...	...	...	IV	9
296	Hymenodictyon excelsum		...	...	III	9
297	Hymenodictyon obovatum		...	...	IV	9
298	Wendlandia Notoniana		...	...	III	40
299	Wendlandia angustifolia		...	...	,,	40
300	Randia gardneri	...	...	...	IV	53
301	Randia Candolleana	...	...	...	,,	55
302	Gardenia latifolia	...	...	...	III	54
303	Gardenia turgida	...	...	...	,,	55
304	Diplospora apiocarpa	...	...	...	IV	55
305	Diplospora sphaerocarpa		...	...	,,	55
306	(Omitted.)					
307	Canthium didymum	...	...	...	III	54
308	Canthium umbellatum		...	...	,,	54
309	Canthium neilgherrense		...	...	,,	54
310	Canthium ficiforme	...	...	...	,,	54
311	Canthium travancoricum		...	...	,,	54
312	Morinda tinctoria	...	...	...	,,	9
313	Rhododendron arboreum		...	...	V	19-a
314	Chrysophyllum Roxburghii		...	...	IV	14
315	Sideroxylon tomentosum		...	...	III	39
316	Isonandra lanceolata	...	...	...	IV	39
317	Dichopsis elliptica	...	...	...	III	23
318	Bassia latifolia	...	...	...	I	59
319	Bassia longifolia	...	...	...	III	39
320	Bassia malabarica	...	...	...	IV	39
321	Mimusops elengi	...	...	...	II	59

Serial No.	Species.	Value class.	Category.
322	Mimusops Roxburghiana	II	59
323	Mimusops hexandra	III	59
324	Maba buxifolia	,,	56
325	Maba nigrescens	,,	56
326	Diospyros pruriens	,,	42
327	Diospyros montana	,,	35
328	Diospyros embryopteris	,,	35
329	Diospyros toposia	,,	42
330	Diospyros foliolosa	,,	35
331	Diospyros ovalifolia	,,	35
332	Diospyros ebenum	II	56
333	Diospyros assimilis	,,	56
334	Diospyros sylvatica	III	35
335	Diospyros microphylla...	,,	42
336	Diospyros chloroxylon	,,	35
337	Diospyros oocarpa	,,	52
338	Diospyros tomentosa melanoxylon ...	II	56
339	Diospyros insignis	III	52
340	Diospyros Candolleana	,,	42
341	Diospyros nilagirica	,,	35
342	Diospyros affinis	,,	35
343	(Omitted.)		
344	Diospyros Bourdilloni	III	52
345	Diospyros paniculata	,,	35
346	Symplocos spicata	IV	12
347	Symplocos kurgensis Warburgi ...	,,	12
348	Symplocos macrocarpa	,,	12
349	Symplocos Gardneriana	,,	12
350	Symplocos Beddomei	,,	12
351	Symplocos foliosa	,,	12
352	Symplocos obtusa	,,	12
353	Schrebera swietenioides	III	45
354	Linociera malabarica	,,	55
355	Linociera intermedia leprocarpa ...	IV	33
356	Olea glandulifera	III	45

Serial No.	Species.	Value class.	Category.
357	Olea dioica	III	45
358	Salvadora persica	IV	9
359	Alstonia scholaris	III	14
360	Tabernaemontana dichotoma	IV	14
361	Tabernaemontana Heyneana	"	14
362	Wrightia tinctoria	"	14
363	Wrightia tomentosa	"	14
364	Strychnos nux-vomica	II	53
365	Strychnos potatorum	III	53
366	Cordia myxa	IV	2
367	Cordia obliqua	"	2
368	Cordia McLeodii fulvosa	III	27
369	Ehretia laevis	IV	33
370	Ehretia ovalifolia	"	33
371	Dolichandrone Rheedii	"	15
372	Dolichandrone crispa	III	33
373	Dolichandrone falcata	IV	33
374	Dolichandrone Lawii	"	33
375	Dolichandrone arcuata	"	33
376	Stereospermum chelonoides	III	50
377	Stereospermum suaveolens	"	50
378	Stereospermum xylocarpum	"	50
379	Pajanelia Rheedii	"	50
380	Callicarpa arborea	"	28
381	Tectona grandis	I	27
382	Premna tomentosa	III	27
383	Gmelina arborea	II	28
384	Vitex altissima alata	I	27
385	Vitex pubescens	III	27
386	Avicennia officinalis	IV	31
387	Myristica laurifolia Beddomei ...	"	3
388	Myristica malabarica	"	3
389	Myristica magnifica	"	3
390	Myristica canarica	III	3
391	Myristica attenuata	IV	3

Serial No.	Species.	Value class.	Category.
392	Cryptocarya Wightii	III	30
393	Cryptocarya Stocksii	„	30
394	Apollonias Arnottii	„	30
395	Beilschmiedia fagifolia	II	51
396	Beilschmiedia Wightii	„	51
397	Beilschmiedia Bourdilloni	III	51
398	Cinnamomum zeylanicum	„	24
399	Cinnamomum sulphuratum	„	24
400	Cinnamomum Wightii	„	24
401	Cinnamomum macrocarpum	„	24
402	Machilus macrantha	„	24
403	Phoebe lanceolata	„	51
404	Phoebe paniculata	„	30
405	Alseodaphne semecarpifolia	II	51
406	Actinodaphne campanulata	III	51
407	Actinodaphne lanata	„	51
408	Actinodaphne Hookeri	„	51
409	Actinodaphne madraspatana	„	51
410	Litsaea tomentosa	„	24
411	Litsaea sebifera	„	24
412	Litsaea polyantha	V	13
413	Litsaea coriacea	III	51
414	Litsaea glabrata	„	24
415	Litsaea Wightiana oleoides	„	51
416	Litsaea zeylanica	„	24
417	Euphorbia antiquorum	V	14
418	Bridelia retusa	II	18
419	Phyllanthus emblica	„	18
420	Glochidion arboreum	IV	18
421	Glochidion Hohenackeri	„	18
422	Glochidion neilgherrense	„	18
423	Glochidion Heyneanum	„	18
424	Putranjiva Roxburghii	III	32
425	Hemicyclia venusta	„	54
426	Hemicyclia elata Wightii	„	55

Serial No.	Species.			Value class.	Category
427	Cyclostemon macrophyllus	...	...	III	50
428	Cyclostemon malabaricus	...	...	IV	50
429	Bischofia javanica	...	... ...	II	28
430	Aporosa Lindleyana	...	... ...	IV	38
431	Daphniphyllum glaucescens	...	...	„	15
432	(Omitted).				
433	Croton malabaricus	...	... ...	III	54
434	Givotia rottleriformis	...	... ...	IV	13
435	Ostedes zeylanica	...	... ...	„	13
436	Trewia nudiflora polycarpa	...	...	„	13
437	Mallotus albus ...	...	... ...	„	13
438	Mallotus philippinensis	...	...	III	38
439	Cleidion Javanicum	...	... ...	IV	13
440	Macaranga indica Roxburghii		...	„	13
441	Sapium insigne	...	... ...	IV	14
442	Holoptelea integrifolia	...	...	III	48
443	Celtis tetrandra	...	... ...	„	32
444	Trema orientalis	...	... ...	IV	4
444a	(bis) Gironniera reticulata	...	...	III	45
445	Streblus asper	...	... ...	IV	8
446	Ficus gibbosa	...	... ...	„	8
447	Ficus bengalensis	...	... ...	III	8
448	Ficus mysorensis	...	... ...	IV	8
449	Ficus tomentosa	...	... ...	„	8
450	Ficus Beddomei	...	... ...	„	8
451	Ficus altissima	...	... ...	„	8
452	Ficus Benjamina	...	... ...	„	8
453	Ficus Trimeni	...	... ...	„	8
454	Ficus Talboti	...	... ..	„	8
455	Ficus retusa	...	... ...	„	8
456	Ficus nervosa	...	... ...	„	8
457	Ficus Rumphii	...	... ...	„	8
458	Ficus religiosa	...	... ...	III	8
459	Ficus Arnottiana	...	... ...	IV	8
460	Ficus tjakela ...	...	... ...	„	8

Serial No.	Species.	Value class.	Category.
461	Ficus tsiela	IV	8
462	Ficus infectoria	„	8
463	Ficus callosa	„	8
464	Ficus asperrima	V	8
465	Ficus cunia	„	8
466	Ficus glomerata	IV	8
467	Antiaris toxicaria	III	8
468	Artocarpus hirsuta	I	26
469	Artocarpus integrifolia	II	26
470	Artocarpus Lakoocha	„	26
471	Salix tetras permaichnostachya ...	IV	4
472	Podocarpus latifolia	„	14

Trees, Shrubs and Climbers not attaining one foot in diameter.

Serial No.	Species.	Category.
473	Uvaria Narum (CL)	13
474	Cyathocalyx zeylanicus (t. 20′ × 6″)	32
475	Artabotrys odoratissimus (SH)	32
476	Unona pannosa (t. 30′ × 6″)	32
477	Unona discolor (SH)	32
478	Unona viridiflora (CL)	13
479	Polyalthia suberosa (t. 20′ × 6″)	32
480	Phaeanthus malabaricus (t. or SH)	32
481	Goniothalamus Thwaitesii } (t. 20′ × 6″) ...	32
482	G. cardiopetalus }	
483	G. Wightii }	
484	Anona squamosa (t. 20′ × 6″)	32
485	Miliusa indica (SH) }	32
486	M. nilagirica }	
487	Miliusa Wightiana (t. 20′ × 8″)	32
488	Orophea uniflora } (t. or SH)	32
489	O. Thompsoni }	
490	O. zeylanica }	
491	(Omitted).	...
492	Cocculus laurifolius (t. 20′ × 6″)	31
493	Tiliacora racemosa (CL)	31

Serial No.	Species.	Category.
494	Berberis nepalensis (t. 20′ × 6″)	16a
495	Berberis aristata (t. or SH)	16a
496	Niebuhria linearis (t. 20′ 6″)	31
497	Maerua arenaria (CL)	31
498	Cadaba trifoliata (t. or SH)	31
499	Capparis divaricata (t.)	53
500	Capparis aphylla (t.)	60
501	Capparis sepiaria (SH. sarm) ...	53
502	Capparis horrida (CL)	10
503	Alsodeia zeylanica (t. 20′ × 6″)	10
504	Flacourtia sepiaria (SH)	40
505	Pittosporum tetraspermum } (t. 20′ × 6″)	33
506	P. nilgherrense }	
507	Pittosporum floribundum (t. 30′ × 8″) ...	33
508	Poligala arillata (SH)	13
509	Xanthophyllum flavescens (t. 20′ × 8″) ...	53
510	Tamarix dioica (t. 15′ × 6″)	2
511	Tamarix ericoides (SH. 7′)	2
512	Hypericum mysorense (SH) }	50a
513	H. Hookerianum }	
514	Garcinia Wightii (t. 25′ × 9″)	53
515	Hibiscus canescens (t. 15′ × 6″)	13
516	Hibiscus collinus (t. 20′ × 6″)	13
517	Hibiscus tiliaceus (t. 30′ × 8″)	10
518	Sterculia populifolia (t.)	11
519	Helicteres Isora (SH. 10′)	32
520	Eriolaena Stocksii } (t. 20′ × 6″) ...	45
	E. Candollei }	
521	Eriolaena Hookeriana (t. 30′ × 9″)	45
522	Eriolaena quinquelocularis (20′ × 6″)	45
523	Leptonychia moacurroides (30′ × 6″)	45
524	Grewia columnaris (SH)	45
525	Grewia orientalis umbellifera (SH. sarm.) ...	45
526	Grewia populifolia (SH. 10′)	54
527	Grewia pilosa (SH. sarm.)	53

Serial No.	Species.	Category.
528	(Omitted.)	
529	Grewia abutilifolia (t. 20′ × 6″)	50
530	Hugonia myatax (SH. sarm.)	54
531	Erythroxylon monogynum lanceolatum (t. 25′ × 6″)	40 a
532	Hiptage madablota } (CL. or SH. sarm.) ...	2
533	H. paravifolia	
534	Melicope indica (t. or SH)	54
535	Zanthoxylum ovalifolium (Sh. sar.)	55
536	Zanthoxylum alatum (t. 20′ × 6″)	33
537	Zanthoxylum tetraspermum (CL)	10
538	Toddalia aculeata (CL.)	13
539	Acronychia laurifolia (t. 30′ × 9″)	13
540	Glycosmis pentaphylla (t. 20′ × 6″)	54
541	(Omitted.)	
542	Murraya exotica (t. 25′ × 8″)	55
543	Murraya Koenigii (t. 25′ × 8″)	54
544	Clausena indica (t. 30′ × 9″)	54
545	C. Willdenovii.	
546	Limonia acidissima (t. 25′ × 8″)	55
547	Limonia alata (t. 20′ × 6″)	55
548	Luvunga eleutherandra (CL)	55
549	Paramignya monophylla armata (CL)	55
550	Atlantia monophylla racemosa zeylanica (t. 30′ × 8″)	55
551	Atalantia missionis (t.)	54
552	Samadera indica (t. 30′ × 8″)	15
553	Balanites Roxburghii (30′ × 8″)	33
554	Ochna squarrosa (t. 30′ × 8″)	50 a
555	Ochna Gamblei (t. 15′ × 6″)	50 a
556	Ochna Wightina (t. 30′ × 8″)	33
557	Gomphia angustifolia (t. 30′ × 8″)	50 a
558	Balsamodendron Berryi (t. 25′ × 8″)	23
559	(Omitted).	
560	Cipadessa fruticosa (t. 20′ × 6″)	50 a

Serial No.	Species.	Category.
561	(Omitted).	
562	(Omitted).	
563	Chailletia gelonioides (t. 20′ × 6″)	26-a.
564	Ximenia americana (SH 15′)	35
565	Olax scandens } (t. or CL)	13
566	Olax Wightiana }	
567	Erythropalum populifolium (CL)	13
568	Cansjera Rheedii (CL)	15
569	Gomphandra axillaries } (t. 30′ × 10″)	13
	G. polymorpha }	
570	Mappia foetida (t. 30′ × 9″)	11
571	Ilex Qalkeri } (t.)	12
572	Ilex Gardneriana }	
573	Euonymus crenulatus (t. 20′ × 6″)	54
574	Euonymus paniculatus }	
575	Euonymus serratifolius } (t. or SH)	54
576	Euonymus angulatus }	
577	Glyptopetalum zeylanicum grandiflorum (t. or SH)	54
578	Microtropis Wallichiana }	
	latifolia }	
	densiflora } (t. 30′ × 8″) ...	15
	microcarpa }	
	ovalifolia }	
579	Celastrus paniculatus (CL)	27
580	Gymnosporia ovata (t) }	
581	Gymnosporia Rothiana }	
582	Gymnosporia Heyneana (t.) }	55
583	Gymnosporia Royleana }	
584	Gymnosporia emarginata } (t. or SH) ...	55
585	Gymnosporia Wallichiana }	
586	Gymnosporia montana (t. 20′ × 10″)	45
587	Salacia prinoides (t. or CL)	31
588	Ventilago madraspatana calyculata (CL) ...	2
589	Zizyphus trinervia (t. 30′ × 10″)	55

Serial No.	Species.	Category.
590	Zizyphus oenoplia (CL 9″)	20
591	Zizyphus horrida (5·20′ × 9″)	40
592	Zizyphus rugosa (t. 30′ × 9″ or CL)	38
593	Rhamnus Virgatus (t. 10′ × 6″)	55
594	Rhamnus Wightii (SH)	33
595	Scutia indica (SH 15′)	36
596	Sageretia oppositifolia hamosa (SH)	20
597	Colubrina asiatica travancorica (SH)	25
598	Gouania microcarpa leptostachya (CL) ...	2
599	Vitis pallida (SH or CL)	2
600	Vitis gigāntea (CL. 5″)	2
601	Vitis Linnaei (SH or CL)	2
602	Vitis semicurdata (CL)	2
603	Vitis anamallayana (CL)	2
604	Leea sambucina (t. 30′ × 6″)	2
605	Leea robusta (SH)	2
606	Leea integrifolia (t. or SH)	2
607	Allophylus cobbe (t. 20′ × 5″)	15
608	Sapindus erectus (t. 25′ × 8″)	13
609	Sapindus bifoliatus (t. 30′ × 10″)	13
610	Dodonaea Viscosa (t. 20′ × 5″)	60
611	Rhus mysorensis parviflora (t. 20′ × 6″) ...	26
612	Moringa concanensis peterygosperma (t. 30′ × 10″)	1
613	Ellipanthus Thwaitesii (t. 30′ × 10″)	15
614	Crotalaria formosa } (SH)	50
615	Crotalaria barbata }	
616	Crotalaria lanata } (SH)	13
617	C. semperflorens }	
618	C. obtecta }	
619	Crotalaria fulva } (SH)	13
620	C. pulcherrima }	
621	Crotalaria laburnifolia (20′ × 6″)	50
622	Indigofera pulchella (t. 20′ × 6″)	50
623	Millettia splendens rubiginosa (CL)	8

Serial No.	Species.	Category.
624	Millettia racemosa (CL)	8
625	Millettia auriculata (CL)	31
626	Mundulea suberosa (t. 20′ × 6″)	50
627	Sesbania aegyptiaca (25′ × 9″)	15
628	Æschynomene aspera (t. 15″ × 3″)	1
629	Desmodium umbellatum (SH)	53
630	Desmodium cephalotes (SH)	54
631	Desmodium pulchellum (SH)	54
632	Spatholobus Roxburghii (CL 18″)	31
633	Bueta superba (CL)	11
634	Dalbergia congesta, rubiginosa, coromondeliana, rostrata, Gardneriana (CL)	11
635	Dalbergia sympathetica (CL)	29
636	Dalbergia tamarindifolia (CL)	29
637	Dalbergia volubilis (CL)	29
638	Dalbergia spinosa monosperma (CL)	31
639	Derris scandens and other species (CL) ...	8
640	Derris uliginosa (CL)	31
641	Sophora glauca Wightii-interrupha (SH) ...	53
642	Calpurnia aurea (SH)	53
643	Caesalpinia Bonducella Bonduc (CL)	34
644	Caesalpinia nuga (CL)	21
645	Caesalpinia sepiaria mimosoides (CL)	21
646	Caesalpinia digyna (CL)	21
647	Mezoneuron cucullatum (CL)	13
648	Pterolobium indicum (CL)	13
649	Wagatea spicata (CL)	13
650	Cassia glauca (t. 20′ × 6″)	62
651	Bauhinia tomentosa (t.)	62
652	Bauhinia vahlii (CL 18″)	31
653	Bauhinia phoenicea (CL)	31
654	Bauhinia anguina (CL 6″)	31

Serial No.	Species.	Category.
655	Entada scadens (CL 6″)	31
656	Dichrostachys cinerea (t. 20′ × 6″)	57
657	Mimosa rubicaulis hamata polyancistra (t. 15′ × 6″)	40
658	Acacia eburnea (t. 30′ × 9″)	40
659	Acacia latronum (t. 20′ × 9″)	58
660	Acacia concinna (CL)	13
661	Acacia intsia (CL)	13
662	Acacia pennata (CL)	20
663	Pithecolobium geminatun (t.)	6
664	Parinarium Indicum travancoricum (t. 50′ × 10″)	20
665	Photinia Lindleyana Notoniana (20′ × 6″) ...	40
666	Cotoneaster buxifolia (20′ × 6″)	40
667	Rhizophora mucronata conjugata (20′ × 8″) ...	59
668	Ceriops candolleana roxburghiana (20′ × 6″) ...	39
669	Kandelia rheedii (20′ × 6″)	2
670	Bruguiera gymnorrhiza eriopetala caryophylloides malabarica (t. 30′ × 6″)	39
671	Bruguiera parviflora (t. 20′ × 4″)	39
672	(Omitted)	...
673	Calycopteris floribunda (SH sar)	5
674	Lumnitzera racemosa (t. 20′ × 10″)	51
675	Combretum decandrum acuminatum (CL) ...	13
676	Combretum extensum ovalifolium (CL) ...	29
677	Quisqualis malabarica (CL)	13
678	Rhodomyrtus tomentosa (SH)	59
679	Eugenia Heyneana (t.)	43
680	Eugenia Jossinia (t.)	43
681, 682	Eugenia codyensis calcadensis Rottleriana (t.).	43
683	Melastoma malabathrica (SH)	33
684	Medinilla beddomei malabarica (SH epph) ...	15
685	Woodfordia floribunda (SH)	40

Serial No.	Species.	Category.
686	Casearia graveolens tomentosa rubescens wynaadensis (t. 30′ × 10″)	54
687	Aralia malabarica (t. 20′ × 6″)	15
687	(bis) Pentapanax Leschenaultii (t. ep)	15
688	Polyscias acuminata (t.)	15
688	(bis) Brassaia capitata (t.)	15
689	Heptapleurum rostratum racemosum venulosum stellatum wallichianum (t. usually epph.) ...	15
689	(bis) Alangium lamarckii (t. 30′ × 12″, usually SH)	51
690	Viburnum coriaceum (var. capitellatum) (t.) ...	54
691	Viburnum hebanthum erubescens (t.)	45
692	Wendlandia exserta (t. 30′ × 10″)	40
693	Wendlandia tinctoria glabrata (t. 30′ × 10″) ...	9
694	Hedyotis stylosa swertioides (SH)	33
695	Mussaenda frondosa (SH)	15
696	Webera corymbosa (t. 30′ × 8″)	55
697	Webera monosperma lucens (t 20′ × 6″) ...	55
698	Byrsophyllum tetrandrum (t. 20′ × 8″)	54
699	Randia uliginosa (t. 30′ × 10″)	54
700	Randia dumetorum (t. 30′ × 10″)	55
701	Randia malabarica (t. 30′ × 10″)	54
702	Randia densiflora (t. 25′ × 6″)	54
703	Randia rugulosa (CL)	54
704	Gardenia gummifera lucida (t. 25′ × 10″) ...	24
705	Octotropis travancorica (t.)	54
706	Canthium parviflorum rheedii angustifolium (t. 25′ × 6″)	54
707	Ixora notoniana (t. 30′ × 10″)	40
708	Ixora polyantha (SH)	40
709	Ixora elongata (t.)	40
710	Ixora porviflora brachiata (t. 30′ × 10″) ...	40
711	Ixora anigricans (t. 25′ × 6″)	40
712	Pavetta indica hispidula breviflora (SH) ...	54

Serial No.	Species.	Category.
713	Psychotria thwaitesii congesta macrocarpa elongata bisulcata anamallayana (t. or SH) ...	33
714	Psychotria sarmentosa (CL)	33
715	Lasianthus venulosus blumianus (t. or SH) ...	54
716	Saprosma indicum fragrans ceylanicum corymbosum (t. or SH)	33
717	Hamiltonia suaveolens (SH 12′)	11
718	Vernonia arborea travançorica (t. 30′ × 9″) ...	11
719	Microglossa zeylanica (SH)	11
720	Vaccinium neilgherrense (t. 20′ × 8″)... ...	19*a*
721	Vaccinium eschenaultii (t. 20′ × 8″)... ...	19*a*
722	Gaultheria fragrantissima (SH)	19*a*
723	Maesa indica (t. 20′ × 4″)	15
724	Myrsine capitellata (t. 20′ × 4″)	2
725	Embelia ribes viridiflora adnata Grahamiana (CL)	2
726	Embelia robusta (t. 20′ × 4″)	2
727	Ardisia courtallensis (t. 20′ × 4″)	2
728	Ardisia humilis pauciflora rhomboidea (t. 25′ × 6″)	2
729	Ægiceras majus (t. 20″ × 4″)	18
730	Symplocos oligandra racemosa subglabra monantha anamallayana microphylla (t. 30′ × 6″)	12
731	Jasminum pubescens (CL)	34
732	Jasminum arborescens (SH. or CL)	15
733	Jasminum cordifolium (CL)	15
734	Jasminum brevilobum (CL 12″)	15
735	Nyctanthes arbor-tristis (20′ × 10″)	54
736	Linociera Wightii purpurea (t. 20′ × 6″) ...	55
737	Olea polygama (t.)	45
738	Ligustrum neilgherrense Walkeri Roxburghii Perrottetii Decaisnei (t. 20′ × 10″)	54
739	(Omitted)	...
740	Azima tetracantha (SH)	12

Serial No.	Species.	Category.
741	Chilocarpus atroviridis (CL)	14
742	Carissa carandas spinarum (t. or SH)	51
743	Carissa macrophylla (t. or CL)	13
744	Rauwolfia densiflora (SH)	13
745	Hunteria corymbosa (t. 30′ × 8″)	51
746	Cerbera odollam (t. 20′ × 6″)	14
747	Thevetia neriifolia (t. 20′ × 6″)	14
748	Ellertonia Rheedii (CL)	14
749	Holarrhena antidysenterica (30′ × 10″)	14
750	Vallaris Heynei (CL)	13
751	Beaumontia Jerdoniana (CL)	13
752	Chonemorpha macrophylla (CL)	13
753	Aganosma caryophyllata cymosa (CL)	14
754	Anodendron paniculatum (CL)	14
755	Gymnema hirsutum (CL)	31
756	Dregea volubilis (CL)	13
757	Buddleia asiatica (t. 15′ × 6″)	33
758	Fagraea obovata zeylanica (t. oft. epph. 30′ × 8″).	13
759	Strychnos colubrina Dalzellii Rheedii Bourdilloni Beddomei cinnamomea (CL 12″)	53
760	Cordia monoica Rothii Perrottetii (t. 20′ × 8″) ...	50
761	Erycibe paniculata (CL)	31
762	Argyreia speciosa and other species (CL) ...	31
763	Solanum verbascifolium giganteum pubescens (t).	13
764	Oroxylum indicum (t. 30′ × 10″)	13
765	Callicarpa lanata (t. 25′ × 8″)	28
766	Premna integrifolia corymbosa coriacea villosa Wightiana (t. or CL)	27
767	Premna latifolia (t.)	28
768	Vitex negundo trifolia (t. 20′ × 8″)	33
768	(bis) Vitex leucoxylon (t. 30′ × 12″)	30
769	Clerodendron infortunatum (t. 30′ × 8″, usually SH)	11
770	Symphorema involucratum polyandrum (SH or CL)	11

Serial No.	Species.	Category.
771	Colebrookia oppositifolia (SH)	33
772	Pisonia aculeata (CL)	6
773	Suaeda monoica (SH)	8
774	Lasiosiphon eriocephalus (25′ × 6″)	54
775	Elaeagnus latifolia (t. 30′ × 10″ or CL)	27
776	Santalum album (t. 40′ × 10″, rarely larger) ...	51*a*
777	Osyris arborea (t.)	40
778	Scleropyrum Wallichianum (25′ × 6″)	25
779	Bridelia montana (t. 30′ × 8″)	30
780	Bridelia tomentosa (t. 25′ × 6″)	55
781	Cleistanthus collinus malabaricus, patulus (t. 25′ × 8″)	43
782	Phyllanthus polyphyllus (t. 20′ × 6″)	53
783	Phyllanthus indicus (t.)	53
784	Glochidion littorale multiloculare lanceolarium fagifolium ellipticum velutinum (t.)	18
785	Flueggia microcarpa leucopyrus (t. 15′ × 6″) ...	40
786	Breynia rhamnoides (t. 20 × 6″)	40
787	Hemicyclia sepiaria (t. or SH)	55
788	Antidesma ghaesembilla Bunius (t. 25′ × 8″). ...	18
789	Antidesma zeylanicum (t.)	18
790	Antidesma diandrum (t. 20′ × 8″)	18
791	Antidesma menasu (t. 50′ × 10″)	18
792	Baccaurea coustallensis (t. 20′ × 6″)	26*a*
793	Croton scabiosus (t. 20′ × 6″)	54
794	Croton oblongifolius (t. 40′ × 10″)	35
795	Croton aromaticus caudatus (t. 20′ × 6′) ...	54
796	Croton Klotzschianus Gibsonianus (t. 25′ × 6″).	54
797	Balachia umbellata reflexa calycina denudata (t. 20′ × 6″)	54
798	Dimorphocalyx glabellus Lawianus (20′ × 6″) ...	55
799	Agrostistachys longifolius indicus (t. 30 × 8″) ...	33
800	Mallotus muricatus Beddomei harmnifolius (t.)	54
801	Mallotus repandus (SH or CL)	54
802	Homonoia riparia (SH)	18

Serial No.	Species.	Category.
803	Gelonium lanceolatum multiflorum (t. 30′ × 10″).	35
804	Sapium indicum (t. 20′ × 6″)	14
805	Excoecaria agallocha (t. 25′ × 10″)	14
806	Excoecaria crenulata robusta (t.)	14
807	Celtis cinnamomea (t. 30′ × 10″)	55
808	Celtis Wightii (t. 40′ × 10″)	55
809	Plecospermum spinosum (SH)	50
810	Ficus hispida (t. 30′ × 8″)	8
811	Cudrania javensis (SH)	50
812	Villebrunia integrifolia (t. 205 × 4″)	11
813	Debregeasia velutina (t. 20′ × 4″)	40
814	Gnetum scandens (CL 17″)	31

CATEGORIES OF MADRAS TIMBERS.

SYNOPSIS.

I.—MOSTLY SOFT TO VERY SOFT.

A.—Mostly very Soft and under 20 *lb.*

1. FEATHER-WOODS.—Lighter than all European woods, Wt. 15-22, Av. 18; White, quickly bluing; Soft to very Soft, spongy or loosely fibrous, P = 300 as far as known; Durability IV—V; Rays b; Pores II-I; VC = IV.

B.—Over 20 *lb. Reddish.*

2. MOTTLE-WOODS.—Conspicuous silver-grain, Rays m; Reddish-brown (see 31, 363, 367); Soft, or (31, 366, 367) Medium, P = 347 as far as known; Durability IV–V (47 = III); Wt. 25-45, Av. 36; Pores I-m; VC = IV; partake of qualities of Plane-tree (F.W. 34) and Linden (F.W. 2), Tamarisk (F.W. 20).

3. NUTMEGS.—Containing blood-red resin; Elasticity doubtful, Soft or (387, 388) Medium, P = 383; Pinkish-white becoming brownish or greyish-Red; Durability

IV; Wt. 30–37, Av. 34; Rays f; Pores m; VC = III; if elasticity confirmed, should be clubbed with category (4)

4. RED WILLOW WOOD.—More or less Elastic, Soft, somewhat of type of European Willow (F.W. 3, 4, 7); Pinkish-white often deepening on exposure to Red-brown, P=300 as far as known Durability IV (65, III); Wt. 27–37, Av. 33; Rays f-ff; Pores I; VC = III; partially also partakes character of Silver Fir (F.W. 10).

C.—Over 20 lb. usually Yellowish to brown (but occasionally Reddish).

5. MANGO WOODS.—Greyish-brown darker towards centre; Medium (164, Soft), P = 530 as far as known; Durability IV; Rays f (164 m); Pores I-m; VC = III; probably should be clubbed category (6).

6. MONKEY PODS.—Yellowish-brown to light Brown centre; Soft (P. only one known = 570); Wt. 22–48, Av. 35; Rays f-ff; Pores I; VC = III; probably should be clubbed with category (5); Durability III (7).

7. MARKING-NUTS.—Replete with blistering grey juice turning black on exposure; Yellowish or Reddish-grey often black-dotted (resin); Soft, P=346; Durability IV; Rays m-f, sometimes darker coloured and giving a good silver-grain, but not always; might perhaps be clubbed with category (2); VC = IV.

8. FIGS.—Replete with white rubbery (463, 464, yellow limpid) juice; mostly Yellowish-white bluing grey, some more distinctly Yellow, others Brown or Red; Soft or (445, 447, 449, 455, 458, 462, 465), Medium, P = 511, Elastic with alternating concentric rings of darker hard and lighter soft tissue recalling the Mountain growth of the European Spruce (F.W. 11); Durability IV (457, 464, V); Wt. 24–41, Av. 32; Rays f, mostly Pores I, mostly, but few; VC = III.

9. CADAMBA-WOODS.—Usually close and even-grained Pale Yellowish (358, white; 291, bright yellow; 312,

bright yellow turning on exposure orange then reddish-pink; 293, 294, 295, pink to pinkish brown); Soft or (292, 293, 294, 295, 312), Medium, P=513; Durability III-IV; Wt. 27–45, Av. 37; Rays f-ff; Pores mostly s, sometimes m (291 I); VC=II.

D.—Over 20 lb. White or Pale-Tinted.

10. SOFT LINDENS.—More or less Elastic, Soft (94, 98 Medium), P=454, as far as known (only two guaged); Yellowish or Pinkish-white soon bluing; Durability IV; Wt. 28–51, Av. 37; Rays m-f; Pores m-s; VC=III; partake of the character of, but believed superior to Linden (F.W. 2).

11. FLOAT-WOODS.—White or pale Yellow quickly bluing; Soft to very Soft, porous, P=416; Durability IV-V; Wt. 21–36, Av. 27; Rays b-m, conspicuous giving a silver-grain; Pores I-m; VC=III; more porous and with more marked silver-grain than the light soft European wood.

12. SOFT HOLLIES,—White quickly bluing; Soft; Durability IV; Wt. 30–40, Av. 35; Rays Biform, b-m also s-ss, giving a conspicuous silver-grain; Pores s-ss; VC=III; might be clubbed with category (11), but heavier and much smaller pored.

13. CROTON BIRCHES.—White or pale Yellow (440 sometimes Red-brown from red resin in the pith which is apt to stain the wood) quickly bluing; Soft, the lighter partaking of the type of Black Poplar (F.W. 9), the heavier of Birch (F.W. 26), P= 451; Durability IV; Wt., of lighter 25–29, Av. 26, of heavier 34–40, Av. 38, general average 33; Rays f-ff (22, m-f); Pores I-m; VC=IV; differs from the two next categories in the larger pores.

14. GUTTA DEALS.—Replete with white guttaperchoid milky (472, thin colourless) juice; White or slightly yellowish-tinted; Soft or (360, 361, 362, 363, 472) Medium,

partaking of the type of Spruce (F.W. 11) or Silver Fir (F.W. 10), P = 517; Durability IV (417 V; 472, III); Wt. 28–49, Av. 33; Rays f-ff; Pores s-ss; VC = III.

15. FALSE DEALS.—White or nearly so quickly bluing; Soft (148, Medium), much of the type of Aspen (F.W. 14), Silver Fir (F.W. 10) or Spruce (F.W. 11), P = 475; Durability IV; Wt. 33–40, Av. 37; Rays f-ff; Pores s-ss; VC = III; perhaps categories (13) (14) and (15) might be clubbed.

Suggested clubbing:—Categories—

(2) and (7) = Madras Planes.
(3) and (4) = Madras Willows.
(5), (6) and (13) = Madras Poplars.
(9), (14) and (15) = Madras Deals.
(11) and (12) = Madras Hollies.

II.—MOSTLY MODERATELY HARD (MEDIUM).

A.—Reddish.

16. BEECH POONS.—Orange-red to Red-brown, light or dark; Medium (233, Hard), good under ground or under water and partakes of the character (as well as appearance) of Beech (F.W. 31) but superior, also somewhat of Elm (F.W. 46), P = 730; Durability II (233, III); Wt. 44–50, Av. 47; Rays Biform bb-b and also f-ff, with fine silver-grain; Pores m-s; VC = II; (not to be confused with Category 22).

17. BEECH DAMMERS.—Replete with resin; Reddish-grey; Medium (49, Hard); partakes of the character of Red Deal (F.W. 18), with the silver-grain and some characteristics of Beech (F.W. 31), P = 541; Durability III; Wt. 37–46, Av. 42; Rays Biform b-m and also f; Pores l-m; VC = II.

18. BEECH FEATHERFOILS.—Red to dark Red-brown or (418) Olive-brown; Medium (419, Hard), good under ground or under water, thus partaking of the characters

of Beech (F.W. 31) or Elm (F.W. 46), P = 660; Durability III, but all especially durable under water and usually also under ground; Wt. 44–54, Av. 50; Rays Biform b-m and also m-f; Pores l-m (315, ll-m); VC = II.

19. FALSE ALDERS.—Greyish-pink to Red-brown; Medium, almost the weight, colouring and silver-grain of Alder (F.W. 19), P = 609; Durability III; Wt. 39–40, Av. 39; Rays Biform bb-b and also m-f; Pores m-s, numerous; VC = III.

19 A. HEATHS (BRIAR-PIPE WOODS).—Akin to (19), but with very small pores; Pinkish-white or light Brown to (or on exposure to) Reddish-brown; Medium (313, Soft); Durability IV; Wt. 40-45, Av. 42; Rays Biform b (few) and f (many) or unequal b-m or m-f; Pores ss-sss; VC = V.

20. RED CEDAR MAHOGANIES.—Pink, light Red, or Red-brown; Medium (115, 133, Soft), distinctly of the Mahogany (F.W. 42-bis) type but softer and lighter in weight, P = 403; Durability III (133, II); Wt. 26-42, Av. 39; Rays m-f, usually good silver-grain; Pores l-m (215, ll-m); VC = I.

21. CAMEL'S-FOOT MAHOGANIES.—Akin to the last, but not nearly so good, size of timber and colouring indifferent; Red-brown (208, 209, sometimes with a central purplish patch); Medium (209, Hard); Durability III-IV; Wt. 37-58, Av. 46; Rays f (207, 208, ff); Pores l-m; VC = III. II. Mostly moderately Hard (Medium); A – Reddish.

22. ASH POONS.—Containing Yellowish gum-resin; Pink (41) or Red-brown, often mottled; Medium, very strong and stronger than Oak (F.W. 44) or the best Red Deal (F.W. 18), very elastic and more so than Red Deal or Ash (F.W. 53), whilst it serves all the purposes of Mahogany (F.W. 42-bis), P=510; Durability II; Wt. 37-46, Av. 42; Rays f-ff; Pores l-m; VC = I; (not to be confused with Cat. 16).

23. RED DEAL DAMMERS.—Replete with balsamic (or
317 with milky guttaperchoid) juice; sapwood white, heartwood Pink-grey to Pink-brown; Medium, partaking somewhat of the characters of second rate Red Deal (F. W. 18), P = 498; Durability IV; Wt. 33-43, Av. 38; Rays m-f; Pores m-s; VC = III.

24. CINNAMONS.—Containing aromatic oil; light red to red-brown often darkening with exposure; Medium, has much the characteristics of the industrial Red Deal (F.W. 18) of the extreme north, P = 458; Durability II; Wt. 35-39, Av. 37; Rays f; Pores m-s; VC = III.

25. SUMAC MAHOGANIES.—Pink-yellow to light red-brown, sapwood paler often copious and bluing very rapidly; Medium (177, Hard), seems intermediate between Mahogany (F.W. 42-bis) and Mastic (F.W. 49), but not so hard, P = 565; Durability III (169, IV); Wt. 57-62, Av. 59; Rays f; Pores m-s; VC = III.

B.—Yellowish to Yellowish-brown.

26. JACKS.—Replete with milky rubbery juice; light to dark yellow of yellowish-brown; Medium, somewhat akin to Oak (F.W. 44) but wanting in the conspicuous silver-grain, P = 645; Durability II; Wt. 36-40, Av. 39, lighter than Oak; Rays m-f; Pores l (469, l-m); VC = I.

26 A. OAK CEDARS.—Akin, but devoid of milky juice and with prominent silver-grain and small pores; yellow to yellowish-brown; Medium; Wt. 40; Rays b-f; Pores s; intermediate between Oak (F.W. 44) and Cedar (F.W. 22).

27. TEAKS.—Light yellow to dark yellowish-brown; Medium or (368, 384, 385) Hard, with many of the characteristics of Oak (F.W. 44) without its conspicuous silver-grain; P = 687; Durability I-II; Wt. 45-60, Av. 52; Rays m-f (381, b-m); Pores m-s (381, often l as well); VC = I.

28. WHITE TEAKS.—Sapwood light yellowish-white, heartwood light Olive-brown with satiny or glossy lustre;

Medium (4, 383, soft), good under ground or under water, coupling this property of Elm (F.W. 46) with that of Teak, P = 518; Durability I (380, II); Wt. 33-38, Av. 36; Rays m-f (380, Biform b and f); Pores m-s (383, 1-m); VC = II.

29. BEECH BEANS.—White or pale yellowish-white deepening on exposure; Medium, somewhat like Beech (F.W. 31) in nature of durability, P = 702; Durability IV, attacked by insects but more durable if seasoned in, and used under, water; Wt. 41-44, Av. 43; Rays f (186, ff); Pores 1-m; VC = IV.

30. YELLOW LAURELS.—Contain more or less aromatic oil; light yellow to pale yellowish-brown, quickly bluing if not seasoned; Medium, apparently intermediate between Silver Fir (F.W. 10) and Evergreen Buckthorn (F.W. 50), P = 666 (? only one species recorded); Durability II; Wt. 32-54, Av. 43; Rays f (410, 411, m-f); Pores m-s; VC = III.

31. BAST-RINGED MAPLES.—Yellowish-white to yellowish-brown, with narrow wavy concentric bast rings separating the wood rings, and in the case of climbers, often radial lines of bast forming the wood into wedges; Medium, could not be used for ordinary purposes, solely for the peculiarity of structure for fancy work; Durability IV-V; Wt. 43-52, AV. 46; Rays f (187, numerous; 386, dark); Pores m-s; VC = IV.

C.—White or lightly Yellow-tinted.

32. ASH MASTWOODS.—White or lightly tinted with pale yellow or yellowish-brown; Medium (11, 20, 21, Hard), very elastic and tough, resembling but stronger than the Ash (F. W. 53), P= 883; Durability III; Wt. 39-60, Av. 46; Rays m-f (9, b-m), with ladderlike crossbars between them (except 443), see F.W. 52, which is identical or nearly so); Pores m-s (13, 20, 21, 443, l-m); VC = II.

33. False Sycamores.—White or lightly tinted with pale yellow or yellowish-brown; Medium (373, 374, Hard), tough, partaking somewhat of the nature of Sycamore (F.W. 56); Durability III, durable under cover at least; Wt. 31–48, Av. 40; Rays f. numerous; often wavy; Pores s (355, 372, m); VC = III.

34. False Maples.—White, satiny or shining; Medium, rather like the Maple (F.W. 55), tough or elastic; Durability III, does not warp but works smoothly; Wt. 53–54, Av. 53; Rays f, numerous; Pores s, scanty; VC = III.

35. White Ebonies.—White ortinged with Yellow or Grey (336, distinctly Yellow), somewhat streaked; Medium (330, 331, 342, Hard; 345, Soft), tough, much like the Birch (F.W. 26) but much more durable, possibly intermediate between that and Italian Cypress (F.W. 25), P = 525 from only two genera); Durability II; Wt. 44–50, Av. 46; Rays f-ff, numerous joined by fine transverse lines; Pores m-s (345, l-m; 330, ss); VC = III.

III.—Mostly Hard.

A.—Reddish.

36. Mahoganies.—Red, or (117, 132, sometimes 201) red-brown, or (231) Pink; Hard (201, Medium), resembling Mahogany (F.W. 42-bis), P = 626; Durability II (111, 201, III); Wt. 41–52, Av. 47; Rays f, numerous (124, 201, m); Pores l-m, (117, 124, m-s); VC = II.

37. Venteaks.—Red-brown; Medium (274 or Hard 275), remarkably like the Chestnut (F.W. 47) except red instead of yellow, fissile (274, very much so), elastic, P = 655; Durability II, especially under water, less so under ground or long exposed to weather; Wt. 43-44, Av. 43; Rays ff, very numerous; Pores l-s (275, l-sss); VC = I.

38. False Pears.—Pink or Greyish to bright red, sometimes slightly brown tinted on exposure; Hard (136, 147, Medium), much resembling the Pear (F.W. 41) especially in the closer-grained series, P = 594; Durability II-III; Wt. 34–54, Av. 48; Rays open-grain f (217, m-f; 136, fff); Close-grain ff (147, f); Pores open-grain m, m-s); Close-grain ss (438, s); VC = II.

39. Sapodillas (and Mangroves).—Containing white milky guttaperchoid juice (not in Mangroves; light or dark red (315, Yellowish) brown; Hard (319, Medium) (no European counterpart), P = 654; Durability II (320, III); Rays f (315, ff); Pores m-s; VC = III.

40. Service Chestnuts.—Sapwood whitish, heartwood Chestnut, or red-brown (26, 271, 281, with an (orange or purplish tinge); Hard (271, 298, 299, Medium), very strong and very tough with the joint properties of the Chestnut (F.W. 47, except its fissibility) and the Service (F.W. 63), P = 803; Durability II (280, 281, I; 151, 216, 218, 298, 299, III); Wt. 48–54, Av. 53; Rays f, numerous (218, m-f; 298, 299, f-ff); Pores s (25, 121, m-s; 218, 281, m; 216, l and s; 271, l-m); VC = II.

41. Litchis (or Ceylon Oaks).—Akin to the last, but heavier and even stronger; light red-brown to chocolate-brown; Hard to very Hard (155, 158), very strong and very tough with the joint properties of Oak (F.W. 44, Service (F.W. 63) and Hornbeam (F.W. 54), P = 860; Durability I; Wt. 58-64; Av. 61; Rays f-ff, numerous; Pores m, few (157 s; 158, l few); VC = I.

42. Red Ebonies.—Red or Pink and streaked (340), or white tinged with Yellow becoming Red on exposure (326) (333 and 338 would also come here when [their black heart is not developed see Cat. 56 under III E); Hard much resembling the Pear (F.W. 41) but heavier, P = 581 (? only one genus reported); Durability II;

Wt. 49-56, Av. 53 ; Rays f-ff, joined by fine transverse bars ; Pores m-s (335, 1) ; VC = III.

43. ELM MYRTLES.—Usually dul reddish brown, sometimes yellowish or greyish brown, sapwood paler ; Hard (261, 266, medium ; 254, very hard), good both under ground and under water like Elm (F.W. 46), P= 638 ; Durability II ; Wt. 36-61, Av. 50 ; Rays f-ff (250, Biform m few and f many) ; Pores m-s. (244-Mundagam, 254, ss ; 261, 1-m) ; VC = II.

B.—Yellowish with Red Heart.

44. GAMBOGES.—Contain yellowish gum-resin ; Sapwood yellowish-white to yellow, very variable in thickness, sometimes trees up to, and over, 1 foot diameter showing no heart, sometimes merging gradually into, sometimes sharply defined from, the deep reddish-brown heartwood, but it is possible that most or all have red heartwood when old (those known to have it marked R) ; Hard to (35, 36, 37, 44) Very Hard, combine the qualities of the Olive (F. W. 64) and Larch (F. W. 17), very compact and homogeneous but very strong and elastic, P=752 ; Durability II ; Wt. 49-61, Av. 54 ; Rays m-f (34 Biform b-m and also f) ; Pores m (35, 1 ; 36, s ; 33, s and ss) ; VC = II.

45. RED OLIVE ASHES.—Sapwood yellowish or pinkish-white, heartwood orange-brown to reddish or even purplish-brown, sometimes deepening, sometimes fading on exposure ; mostly Hard (class ii) (Class i-74, 75, 80, 77, Medium ; Class iii-76, 81, 444 bis. very hard), appear to combine the elasticity and toughness of the Ash (F.W. 53) with the compactness and, to a certain extent, colouring of the Olive (F.W. 64), P = 614 ; Durability Class I IV, class II III, class iii II ; Wt. 42-57, Av. 48 ; Rays f (77, ff) ; Pores s (356, 357, m) ; VC = II.

45-A. FALSE NEWS.—Akin to this, small trees rather heavier and smaller pored ; Red to reddish-brown ;

Hard elastic and tough resembling the Yew (F.W. 27); Wt. 49-50, Av. 50; Rays m-f; Pores ss. (555, s).

C.—Yellow to Yellowish-brown.

46. SOAPNUT.—Bright yellow; Hard, resembling Hornbeam (F.W. 54) but heavier, P= 704; Durability IV; Wt. 67; Rays ff, numerous; Pores m, few; VC= IV.

46-A. BARBERRIES.—Akin to this, small trees lighter and smaller pored; Bright Yellow; Hard; Wt. 45-51, Av. 48; Rays m; Pores s-ss.

47. FALSE WALNUTS.—Sapwood yellowish-white, heartwood light to dark yellowish-brown often flushed or mottled with red, purple or black tints; Hard (227, 237, very hard), closely resembling the Walnut (F.W. 23); P=873; Durability II (227 I; 237, 238 III); Wt. two classes, i-46-51, Av. 48; ii-55-62, Av. 59; general average 52; Rays f-ff, often numerous; Pores 1-m; VC=II.

48. FALSE ELMS.—Yellowish-grey to olive-brown, sometimes lightly tinged with red Sapwood paler; Hard (442, Medium; 240, very hard), rather paler and heavier than Elm (F.W. 46), tough and doing well under water, P = 768; Durability III (235, IV), does not stand atmospheric changes, but improved by being kept under water; Wt. 40-54, Av. 48; Rays, f-ff, numerous; Pores 1-m (443, s); VC = III.

49. OLIVE DAMMERS.—Contain considerable quantities of resin; sapwood pale yellow, heartwood light to dark yellowish-brown, sometimes with a tinge of Red; Hard (54 very hard), very strong, stronger than teak tough and elastic seeming to combine the qualities of the best Larch (F.W. 17) or Riga Fir (F.W. 18) with those of Elm (F.W. 46), as it is exceptionally good under ground, P=825; Durability I (53, 54, 60, 61, III); Wt. 54-67, Av. 59; Rays m-f; Pores m-s (53, 54, I-m); VC = I.

50. WHITE CEDARS.—Yellowish-white to orange or yellowish-brown often mottled with darker streaks,

somewhat resembling the Olive (F.W. 64) or Mulberry (F.W. 33) in colouring; Hard (128, medium; 378, 379 very hard), very strong, elastic tough, and close-grained joining the qualities of Ash (F.W. 53), Birch (F.W. 26) and Olive (F.W. 64), P=827; Durability III (118, II); Wt. 40-54, Av. 48; Rays f, numerous; Pores m-s (29, 376, 377, 379, 427, 1-m); VC = II.

50-A. MULBERRY BOX.—Akin to this, shrubs lighter in weight and with much smaller rays and pores; sapwood white, heartwood orange-red; Hard; Wt. 43; Rays ff, exceedingly numerous; Pores ss.

51. OLIVE LAURELS.—Containing more or less aromatic oil; pale golden-yellow to golden-brown deepening with age; Hard, with fine glossy dense texture, very strong, somewhat resembling the Olive (F.W. 64), P=761; Durability I; Wt. 42-55, Av. 50; Rays f (406-409, m; 396, ff); Pores s (405, 406-m); VC = II.

52. STRIPED EBONIES.—Variable in color—337, grey-brown becoming purple-black towards centre with streaks here and there; 339, white when newly cut changing to dirty grey with rarely a small black patch in the centre and pale streaks; 344, Yellowish-grey with irregular rings of black shaded into brown; Hard (337, medium; 344, very hard), somewhat resembling the Pear (F.W. 41) in quality but not in colour, P = 785 (? only 344 recorded); Durability II; Wt. 45-54, Av. 50; Rays f-ff Pores s (337, 1-m); VC=III.

D.—White or lightly Yellow-tinted.

53. FALSE HORNBEAMS.—White or pale yellowish-white (Class ii-203, 214-forming a very small purple-brown heartwood in old trees only); Hard (214, very hard), tough, tenacious, compact, resembling Hornbeam (F.W. 54) in character, colouring and (Class i) weight, P=766; Durability III (203 II); Wt.-Class i, 46-58, Av. 53; Class ii, 59-75, Av. 67-general average 57;

Rays m-f (208, ff); Pores m-s (364, 365, Biform I, few and ss numerous); VC = II.

54. FALSE WHITE SERVICE.—White or lightly yellow tinted; Hard (152, very hard), homogeneous, compact resembling the White Service (F.W. 59), not so heavy nor quite so small pored as the Box (F.W. 65), P = 577 (? only two general recorded); Durability II-III; Wt. 51-54, Av. 52; Rays f-ff, numerous (152, fff); Pores s (152, m); VC = III.

55. FALSE BOX.—White or lightly yellow-tinted; Hard (Class i) or very hard (Class ii-123, 134, 142, 143, 272), very compact, very homogeneous and tenacious, resembling Box (F.W. 65) but not quite so heavy, P = 943 (? only 123, 134, recorded); Durability II (134, I); Wt. 55-65, Av. 59; Rays f-ff, numerous; Pores s-sss, or ss; VC = II.

E.—Black Heartwood.

56. BLACK EBONIES.—If the heartwood is not fully developed, 324, 425, 332, pass into categories 35 or 52, and 333, 338 into category 42; Sapwood grey or (333, 338) red, heartwood when fully developed Jet-black; Hard or (332, 333) very hard, sapwood very strong and very tough resembling Pear (F.W. 41), heartwood harder but more brittle, P = 980; Durability I of heart-, II of sapwood; Wt. 58-70, Av. 64; Rays ff; Pores s-ss (338 sometimes I-m; 324, 325, m-s); VC = II.

IV.—MOSTLY VERY OR EXTREMELY HARD.

Reddish or Yellowish (in order by weight).

57. MAROON IRONWOODS.—Very dark blackish-red or red-brown, sometimes with claret or purple tints; Extremely hard turning the axe edge, having no European counterpart, very strong, P = 938; Durability I, in all circumstances, in air under ground and under water; Wt.

70-76, Av. 73; Rays f, numerous (131, m; 43, fff); Pores m; VC = I.

58. CUTCH.—Dark yellowish- or olive- brown or dark red, sapwood paler; very hard, very strong, fibrous, close-grained, elastic and tough, no European counterpart, P = 812; Durability I; Wt. 68-76, Av. 71; Rays f, numerous (220, m); Pores l-m (219, s); VC = II.

59. i. SAPODILLAS (and ii. MANGROVES).—Class i containing (Class ii not) white milky guttaperchoid juice; red-brown, chocolate or purple-brown, sapwood lighter; very hard (72, hard), strong tough close-grained with no European counterpart, the nearest being Service (F.W. 63) than which this is superior and heavier, P = 815; Durability I, under all circumstances even salt water; Wt. 57-67, Av. 63; Rays—Class i (Sapodillas), f-ff; Class ii (Mangroves), m-f; Pores—Class i, s, 318, m; Class ii, l-m; VC = I.

60. FALSE OLIVES.—Light yellow or yellow-grey deepening in the centre to dark or purplish-brown sometimes mottled with black; very hard, resembling the Olive (F.W. 64) very strong—specially for transverse strains—very tough and close- but often cross- grained, P = 923; Durability uncertain II-III, does not resist long periods of atmospheric alternations well, and individual timbers of the same species apt to vary considerably in durability; Wt. 61-62, Av. 62; Rays f-ff, very numerous; Pores s-ss; VC = II.

61. SERVICE MAHOGANIES.—Pink, red or red-brown; very hard, having all the appearance of Mahogany (F.W. 42-bis) with fine texture, but harder, at the same time the toughness and closeness of texture of Service (F.W. 63), P = 917; Durability II (113, I); Wt. 56-60, Av. 58; Rays f, numerous (127, ff); Pores s (121, m, few); VC = I.

62. FALSE LABURNUMS.—Dark yellowish-brown to black-brown sometimes also with a red tinge, often mottled; very hard, elastic much of the type of Laburnum (F.W. 48), P = 734; Durability II (273, III); Wt. 53-61, Av. 57; Rays f (192, ff); Pores l-m; VC = II.

63. KINOS.—Yellow-brown with darker streaks or light to dark red-brown; very hard or (212) extremely hard, containing a red gum resin that is apt to stain anything damp in contact with it, close-grained, with no European representative, but the two species here may well be compared with the two kinds of Oak (F.W. 44), 189 and Sessile Oak being used for joinery, cabinet-ware, and industrial uses, whilst 212 and Peduncled Oak are used for construction uses, P = 835 (Oak = 606); Durability II; Wt. 51–59, Av. 55; Rays f-ff; Pores l-m, filled with resin; VC = I.

64. ROSEWOODS.—Variable in colour. 165 (Tinnevelly Rosewood), dark bright Coppery red mottled with black and orange; 189 (Ojein Rosewood) light to dark red-brown mottled; 184 (Malabar rosewood) dark purple with black streaks; 185 (outer hills rosewood) dark purple-brown with dark brown or dark purple streaks; very hard (185, extremely hard), very strong close-grained fibrous, no European representative, P = 771; Durability II; Wt. 51-56, Av. 54; Rays f, numerous (165, ff, very numerous); Pores l-m; VC =I.

SCHEME OF VALUE CLASSES OF THE TREES OF THE MADRAS PRESIDENCY.

The commercial value of a timber depends on its quantity and on its quality; the quantity depends on the size to which the tree is capable of attaining and on its abundance, whilst its quality depends on its durability and its power of utilization. A timber of good quality is not commercially valuable if not capable of being obtained in quantity; an example of this is 177. Nothopegai

Colebrookiana, a strong, hard, close-grained, pretty pinkish-yellow wood with satiny lustre, scattered about in various parts of the Presidency but nowhere common; on the other hand, woods, not intrinsically of more than inferior quality, become commercially valuable when they attain great size and are abundant; examples of this are the Deals of Europe; the Spruce, grown in low or marshy localities, is soft spongy and of inferior quality, but this is the quality most on the market and which always commands a sale. An attempt has been made herein to bring together into categories the timbers which have, as nearly as may be, similar qualities of hardness, weight, colouring etc., such, that no two species, it is believed, in a category are more diverse in their qualities than is, for the most part, a single species in Europe; it will be noticed that, if we take the commoner European species, e.g., OAK, SCOTCH FIR, SPRUCE, their qualities vary considerably according to their conditions of development and far more than ordinarily is the case in our Indian species or, indeed, between them and many allied species. Our numbers are very great, and therefore very confusing; and this attempt to bring them into categories has the double object in trying to simplify matters and reduce the confusion on the one hand, and to increase the abundance of the species in the commercial category and thereby enhance the value of that commercial category. It is possible, indeed probable, that even some of these categories can be clubbed together; so much the better, it all tends to reduce confusion in the market and to increase the abundance and commercial value of the category. In this country hitherto the value of a timber has been gauged almost entirely by its qualifications as a timber for construction, that is to say, dependent on its durability; but it will be seen that the bulk of the commercial timbers of Europe have little or no durability, but are put to a vast number of

industrial uses under cover after being well dried and seasoned; and there can be no doubt but that the majority of our commoner and softer species, if properly treated on the same lines, would be equally serviceable.

S = Size class. Of this five classes have been taken, as under:—

I = 4 ft. and over in diameter, height taken at		80 ft.
II = 3–4 ft.	... ...	60 ft.
III = 2–3 ft.	... ...	50 ft.
IV = 1–2 ft.	... ...	40 ft.
V = Under 1 foot	... ...	25 ft. or less.

D = Durability class. This has been abridged from Schneider's Pamphlet, "Commercial Woods of the Philippines," the timbers there being mostly identical or very closely allied:—

I. = "*Very durable;* such woods are probably rarely attacked by insects, except after they have been softened by decay, that is, by attacks of fungi after long exposure to exceptionally severe conditions. They resist exposure to the weather or contact with the ground for long periods. All timbers in this class are believed to surpass in durability any commercial timber of the temperate Zone."

II. = "*Durable;* these woods are very rarely attacked by insects and will last many years even in contact with the ground, or even exposed to the weather."

III. = "*Durable;* woods of this class are not commonly or severely attacked by insects. They resist the weather fairly well and last several years even in the ground. Most of the woods of this class would, it is believed, compare with the woods of average durability in the north temperate zone."

IV. = "*Not durable;* these woods, although not termite-proof, are not specially subject to attacks of other insects, i.e., not invariably attacked as are certain other

woods; but the sapwood is often poor in this respect, and woods of this class, unprotected by paint or preservatives should not be exposed to conditions of constant moisture or of constant alternations between moisture and dryness. Thus, they are not recommended for use in the ground or for exposure to the weather when woods of other classes are available. There is included in this class no wood believed to be inferior to the Medium Grade Construction Timbers of the United States, e.g., Oregon Pine."

V. = "*Poor; attacked by beetles, etc.;* certain woods known to be less resistant than the last class to decay and insects; usually this class is not designated by a number."

U. = Utility Class. The actual mode of utilization of the different species has been extracted from Brandis' Flora of N.W. India, Beddome's Flora sylvatica, Gamble's Manual of Timbers, Kurz Flora of Burma and Bourdillon's Travancore trees; in addition I have on one or two occasions made use of my own experience. In the case of identical, or very closely allied and practically identical, species in the Philippines, the uses given in Schneider's Pamphlet have also been given. Four classes of utility have been adopted:—

I. Many major uses; comprising all big construction works, cabinet-work and furniture which demand a high class timber (but not common furniture); engraving and carving, etc., although major uses, have been classed under the next class as "few major uses."

II. Few major uses, or many medium uses; include construction of ordinary buildings, secondary boat-work, carts, agricultural implements, and such like, which demand a good, but not a very fine, timber; oil- and sugar-presses, although demanding special classes, i.e., very tough—of timber yet the quantity required being limited, also come in this class.

III. Few medium uses, or many minor uses; minor uses are box-lumber and other uses to which common woods are put.

IV. Few minor uses.

A.=Abundance class. The Presidency has been taken as the unit of distribution. Four classes of abundance have been adopted, as under:—

I. Abundant in many districts.

II. Abundant in few districts, or common in many districts.

III. Common in few districts, or scattered in many districts.

IV. Scattered in few districts.

VC = Value Class. This is computed from the above four classes, by giving the class figure as marks or points, adding all these points together and, if the result comes to:—

6 or under, it goes into class	I
7 to 9	II
10 to 12	III
13 to 15	IV
16 to 18	V

The very best timber imaginable would come into the first class in all four classes, that is, it would secure 1, plus 1, plus 1, plus 1 points, or 4 points altogether, and would come into the I. Value Class; the worst timber imaginable would come into V. Size, V. Durability, IV. Utility and IV. Abundance, and thus would secure 5, plus 5, plus 4, plus 4, or 18 points altogether, and would come into the V. Value Class; it can hardly be expected that any timber would reach the acme of either goodness or badness, a certain latitude must be given by a couple of points in each direction, and a similar latitude is allowed in the intermediate classes in the same way. It is believed that this mode of computation of the Value classes is as fair as can be devised.

One further remark must be made in connexion with some of the timbers introduced into some of the categories. It has been said that this clubbing increases the abundance of the commercial category, and it must be remarked that a category cannot have a smaller commercial value than that of its best species, but, by increasing the abundance it may occasionally pass into a higher class. Now, if we take category 27. Teaks, we see in it Premna tomentosa ; this timber is certainly not up to the standard of the best teak, but on the other hand it is just as good as the inferior teak ; in this country we often find that a useful piece of teak timber is being cut up into small slats, for which inferior pieces would do just as well, and for which Premna would do just as well ; if this were done, it would free the good piece of teak for the better purposes for which it is intended by nature ; and therefore we are justified in bringing the Premna (which has all the characters of small sized teak) into this category.

CATEGORIES OF MADRAS TIMBERS.

DETAILS.

I.—MOSTLY SOFT TO VERY SOFT.

A.—Mostly Very Soft, and under 20 lb.

(1) FEATHER-WOODS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
24. Cochlospermum gossypium.	17	...	5	5	4	2	V	Dry tracts most districts.
68. Sterculia villosa.	19	...	3	5	4	2	IV	DKN., CNTC., MPLT., WGTS.
69. Sterculia guttata.	15	147	3	5	4	3	IV	WGTS., KAN.-TVY., MRA., CBT.
178. Spondias mangifera.	22	454	3	5	4	4	V	NCSS., MPLT., DKN., WGTS., scat.
179. Spondias acuminata.	...	...	5	5	4	4	V	BEL., KAN., MBR., CBT., scat.
181. Erythrina stricta.	16	...	4	4	3	3	IV	MPLT., CNTC., WFTS.
182. Erythrina suberosa.	19	...	4	4	3	3	IV	NCCS., COCT., DKN., MPLT.

Uses.—24, 68, 69, 178, 179 (none given by Bed. Bs. Gbl.). "Sterculia. Cheap temporary construction, temporary mining timber, box-lumber, match-wood" (Schneider). 181, 182, Planking, packing-cases, steve-frames, household jars, lacquered boxes, scabbards, trays, toys (substitute for Deal, retains varnish better than almost any wood, not liable to warp, crack or split, durable when painted) (Bed. Bs. Gbl.); fishing floats, buoys (Schneider).

NOTE.—These being lighter than any European wood, that lightness should be made the most of.

Vernaculars.—24 (U) = Konokopoḷāso, Pobosokoniārī; (Tl) = Kondagōgu, Adiviburaga; (Ta) = Kāttilavu, Kāttuppancu, Kōngilavu; (M) = Appakutaka, Pannināra, Sīmappanni; (K) = Arasinaburaga, Kāduburaga. 68 (T) = Ponaku, Nāraponaku, Kummaraponaku; (Ta) = A'nainār, Vakkunār, Tanakku; (M) = Cavali, Vakku, Banninār; (K) = Bilidaili, Sāvige, Pulukusāvige. 69 (Ta) = Kaludaividai, Pī, Kāvalam, Tondi; (M) = Kāvalam, Pī, Kīltondi, Rāmannappū; (K) = Happusāvige, Jēnukāyitaili, Kampārike. 178 (U) = A'mboto; (Tl) = Adāvimāmidi, Kondamāmidi; (Ta) = Ambalam, Kāttumā, Pulimā; (M) = A'mpalam, Kāttāmpalam, Māmpuli; (K) = Amate, Marahunise. 178 (Ta) = Pulipilai; (K) = Kādambate. 181 & 182 (U) = Bonopālod'huā; (Tl) = Mullumōduga, Munimōduga; (Ta) = Murukku, Mullumurukku, Vellaikkalayānamurukku; (M) = Murikku Kaliyānamurikku, Mulmurikku; (K) = Kaduparivāla, Mulluhongāra.

Under 1 *foot diameter of the same category* :—612, 628.

Exhibits.—24 (small panel, large block). 68 (small panel, large block). 69 (large panel, large block). 178 (large panel, small block). 181, 182 (s. panel, l. block); E. indica (exhibited) identical.

B.—Over 20 lb. reddish.

(2) MOTTLE-WOODS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
31. Tamarix gallica.	44	...	5	4	3	3	IV	Most large rivers and list
47. Eurya japonica.	45	...	5	3	3	3	IV	WFTSG., NLGS., high sholas.
67. Syerculia urens	41	...	3	5	4	2	IV	Dry tracts most dist.
161. Meliosma Wightii.	36	370	4	4	4	4	V	WGTS., NLGS., high sholas
162. Meliosma simplicifolia.	32	...	4	4	4	4	V	WFTS., CRG.-TVY., NLGS., Anms.
163. Meliosma Arnottiana	25	325	4	4	4	4	V	WFTS., CRG.-TVY., NLGS., Anms.
366. Cordia myxa (M).	33	...	5	4	3	3	IV	All dists. scat.
367. Cordia obliqua (M).								

European timbers quoted.—Tamarisk (F.W. 20); Linden (F.W. 2); Plane (F.W. 34). *Uses.*—31, Turning, lacquered work, agricultural implements (not strong but tough—Gbl.). 47 (Building, but requires careful seasoning—Gbl.). 67 Guitars and toys—(Gbl.). 161, 162, 163 (not used except occasionally for) rafters (Gbl.), takes good polish, Kurz.). 366, 367, Boat-building, canoes, well-curbs, agricultural implements, gun-stocks, tea-boxes (seasons well but attacked by insects and does not stand exposure—Bed. Gbl.); posts and light construction (Schneider).

Vernaculars.—31 (U) = J'hānu; (Tl) = E'rusaru, Erracirusaru, Pakke, Palligi; (Ta) = A'rruccavukku, A'rralari, Ciruccavukku, Civappārruccavukku; (M) = J'havukam. 47 (Ta) = A'rruttuvarai; Huluni; (M) = A'rruttuvara; (K) Hūlayane. 67 (U) = Gūdālo; (Tl) = Ponaku, Erraponaku, Tanuku, Tapasi; (Ta) = Cendālai, Cendanakku, Cigapputtanakku, Tanakku; (M) = Tonti; (K) = B'hutaili, Kempudaili, Punise. 161, 162, 163 (Ta) = Cembavu, Kallavi, Kuccavir, Kadiri, Tagari; (M) = Kallavi, Kuccavir, Kattukkiluvi; (K) = Mette, Tode, Kancemogge, Masavala, Holemogge. 366, 367 (U) = A'mob'hoto, Bohurolo, Domolo, Kop'hokoturī;

(Tl) = Nakkera, Nekkara, Bankanakkera ; (Ta) = Celu, Naruvili, Viriyan, Viri, Mukkuccelu ; (M) = Celu, Ceruvanicci, Viri, Viriyasam ; (K) = Calle, Cotte, Hādige.

Under 1 *foot diameter of the same category* :—510, 511, 532, 598, 599, 600, 601, 602, 603, 604, 605, 606, 726, 728 ; Heavier and paler—579, 588, 669, 724 and 725.

Exhibits.—67 (large and small panel, and large and small block). 161 (l. and s. panel, l. and s. block). 163 (l. and s. panel, l. and s. block). 388 (l. and s. panel, l block).

(3) NUTMEGS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
387. Myristica laurifolia (M) Beddomei.	34	356	2	4	3	3	III	WFTS., KAN.-TVY., CBT.
388. Myristica malabarica (M).	37	460	4	4	3	3	IV	WGTS., KAN.-TRV.
389. Myristica magnifica	30	375	2	4	3	4	IV	WGTS., KAN.-TRV., scat.
390. Myristica canarica.	34	409	2	4	3	3	III	WGTS., CRG.-TVY.
391. Myristica attenuata.	35	514	4	4	3	3	IV	MPLT., WGTS., KAN.-TRV.

Uses.—(387—391, not used,—Bed. Bdn.). 387, Coffee—and plumbago—casks, tea-boxes, packing-cases, coffins (Gbl.). 388, Building (Gbl.). "Myristica (Seasons with little checking and warping, but liable to stain badly ; very easy to work, very frequently attacked—sapwood always, heartwood frequently—by beetles), light and temporary construction, cheap furniture, kitchen and other household utensils, cheap cigar-boxes, dry-measures, tiles (i.e., sleepers) on logging railroads".

Under 1 *foot diameter in the same category* :—(None.)

Vernaculars.—387 to 391 (There is so much confusion among the vernacular names of the species that here they will be clubbed together). (Ta) = Cādikkāy, Kāttuccādi, Palgavi, Palminigi, Pattapānu, Cōlaivēngai, Cūrappānu, Undippānu, Pānu, Kariyan ; (M) = Atakkappayan (same name used also for 51), Kāttujātikkā, Pattapānu, Ponnanpānu, Cōlavēnna, Sūrappayan,

Untappānu, Cōraspānu, Pōnu, Kariyan (same name used for 170), Pintikkāya, Cennelli, Cōlakkavullu (same name used for 7); (K) = Jājikāyi, Kādujājikāyi, Nētrage, Kānage, Rāmapatre, Rāmanadike, Pinde, Kādupinde, Rikta.

Exhibits.—391 (l. and s. panel).

(4) RED WILLOW-WOODS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
65. Cullenia excelsa.	37	304	1	4	3	2	III	WGTS., CRG.-TVY., NLGS., ANNS.
79. Pterospermum glabrescens.	29	...	4	4	4	3	IV	WGTS., MBR.-TVY.
444. Trema orientalis.	27	297	4	5	4	2	IV	NCCS., DKN., MPLT., WGTS.
471. Salix tetrasperma-ichnostachya.	33	...	2	4	3	4	IV	NCCS., MPLT., WFTS., NLGS.

Uses.—65 (Not used—Bed. Bdn.), planking and boxes (Gbl.), building (in Tinnevelly). 79 (Not used —Bed. Gbl. Bdn.). 444 (Not used—Bed. Gbl. Bdn.), wooden shoes (Schneider). 471, Posts and planks, tried unsuccessfully—too heavy. 79 or 444 might do better, A.W.L.—for cricket bats (Gbl.).

European timbers quoted.—White Willow (F.W. 3); Sallow (F.W. 4); Crack Willow (F.W. 7); Silver Fir (F.W. 10).

Vernaculars.—65 (T) = A'naippalā, Malaikkoncil, Pālāvu, Vedbalā, Kārānai; (M)=Cempayira, Elancakka, Vellirumpakam, Kārāni, Kārānnili. 79 (Ta) = Vattambolavu; (M) = Bāttu (same name used for 405), Pāmaram, Vattapolāku, Mūlippolaku. 444 (U) = Jibono; (Tl) = A'va, Budumuru, Cēkamānu, Gadanelli, Kākamushti, Morali; (Ta) = Vendai, Kurrippalā, Mudālai, Peymunnai, Virai; (M) = A'mi, Malatontali, Amba-rāti; (K) = Hōme, Bende (same name used for 62, 515 and 516), Kādubaja, Kiruhāle. 471 (U) = Bāisi, Panijāmo; (Tl) = E'tipāla, E'tipisinika, Kondagannēru; (Ta) = A'rruppālai, Niruvanci, Vanci; (M) = Arali, Nirunci, Vanci, Vayisi; (K) = Niruvanji, Bāyise, Bayike.

Under I *foot diameter in the same category*:—(None.)

Exhibits.—65 (l. and s. panel, l. block). 444 (l. panel, l. block). 471 (s. panel, l. block).

C.—Over 20 lb. Yellow to Yellowish-brown.

(5) MANGO WOODS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
164. Mangifera indica.	42	607	2	4	2	3	III	NCCS., DKN., WGTS., Ravs., scat.
166. Buchanania latifolia.	43	452	4	4	2	2	III	Most Dist. dry forests.
167. Buchanania angustifolia.	43	...	4	4	2	3	IV	DKN. southwards. (dtts.).
168. Buchanania lanceolata.	...	...	4	4	2	3	IV	NCCS., CNTC., MBR.-TVY.

Uses.—164. Door and window frames, planking, packing-cases, tea and coffee boxes, opium and indigo boxes, canoes and masula-boats (Bs. Bed. Gbl.); occasionally for house and coach building purposes, and packing cases (soon decays if exposed to wet, takes an indifferent polish—Kurz). 166, Window-frames, doors, tables, bullock-yokes, bedsteads and boxes (Bs. Gbl.). 167, 168. (Not used—Bs. Gbl., used for a variety of purposes—Bed.); "Buchanania. (The wood of all "species is practically identical, grain straight but fre-"quently with small knots, seasons well and works very "easily, sapwood often attacked by beetles), light "construction, flooring, interior finish, house-posts above "stumps, joists and rafters, furniture, household imple-"ments, musical instrument necks, cheap cigar-boxes, "dry-measures boxes" (Schneider).

European timbers quoted.—The uses, as above given, are precisely those of the Deals; Silver Fir (F. W. 10), Spruce (F. W. 11), Scotch Fir (F. W. 18).

Vernaculars.—(U) = A'mbo; (Tl) = Māmidi; (Ta) = Mā; (M) = Mānnā, Māvu; (K) = Māvu. 166 (U) = Cāro; (Tl) = Cāra, Cāramāmidi, Jvaramāmidi, Mōralli, Cinnamōralli; (Ta) = A'yma, Cārai, Kāttumā, Mudaimā,

Moralai; (M) = Kālamāvu, Mural, Nuruvi; (K) = Kolegēru, Kolemāvu, Morale, Morave, Murukāli. 167 (Tl) = Çāra, Mōralli, Peddamōralli, Induba; (Ta) = Kalmā, Kāttumā, Mudaimā, Pulimā; (M) = Malamāvu. 168 (Tl) = Pandijāruga; (Ta) = Miricudā; (M) = Malamāvu.

Under 1 *foot in diameter of the same category*:—673.

Exhibits.—164 (s. panel, l. block). 166 (s. panel, l. block). 167 (s. panel).

(6) MONKEY-PODS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
266. Albizzia stipulata.	35	570	3	3	2	3	III	NCCS. (Agts.), WFTS.
228. Pithecolobium umbellatum.	48	...	4	3	3	4	IV	KSN., CNTC.
229. Pithecolobium bigeminum.	22	...	4	3	3	3	IV	WGTS., KAN.-TVY.
230. Pithecolobium subcoriaceum annamallayana.	...	...	4	3	3	3	IV	MBR.-TVY., Anms., Pnis.

Uses.—226 (Sapwood attacked by insects—Bs.—takes good polish—Kurz), Building, cabinet-work, furniture, cart-wheels (naves), tea-boxes, cattle-bells (Bed. Gbl. Kurz). 228, 229, 230 (Not used,—Bed. Bs. Gbl.—but the wood is practically identical and could be used in similar ways—A.W.L.).

European timbers quoted.—(The other Albizzias—see Cat. 47—resemble Walnut—F.W. 23—but are harder; this category seems intermediate between Walnut and Spruce (F.W. 11), from structure and above uses.)

Vernaculars.—266 (U) = Gūdānāudiā, Reyi; (Tl.) = Cinduga, Kondaciguru, Kondadirisanamu; (Ta) = Cilai, Cilaivāgari, Karrurincil, Pilivāgai; (M) = Vāka, Mottuvāka, Pottuvāka; (K) = Bāge, Bettabāge, Hottubāge, Kalbāge, Kottapāli. 228 (Tl) = Colangi; (Ta) = Iluvai. 229 (Ta) = Kalaippākku; (M) = Konacatti, Koranjati, Kānnatti, Attapparanta, Kalpākku, Kāttukkonna, Muttakkoluppan; (K) = Kadukonde. 230 (Ta) = Malaivāgai; (M) = Urimpukkunni, Urimpukkonna.

Under 1 *foot in diameter of the same category*:—663 and 772.

Exhibits.—226 (s. panel, l. block). 228 (small timber section). 229 (l. and s. panel, l. and s. block). 230 (l. and s. panel, l. and s. block).

(7) MARKING-NUTS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
171. Semecarpus anacardium.	37	214	4	4	4	2	IV	Open forest, all dist.
172. Semecarpus travancorics.	26	425	2	4	4	4	IV	MBR.-TVY.
173. Semecarpus auriculata.	25	404	3	4	4	4	IV	MBR.,-TVY.
174. Holigarna Arnottiana.	25	343	4	4	4	3	IV	WGTS., CRG.,-TRV., NLGS.
175. Holigarna ferruginea.	...	...	...	...	...	...	...	
176. Holigarna Grahamili Beddomei.	26	...	3	4	4	3	IV	WGTS., CRG.-TRV., NLGS., Anms.

Uses.—(Seldom felled, or used, owing to the blistering acrid juice, but occasionally used for) house and boat building (Bed. Bs. Gbl.); "Semecarpus (a genus of about twelve species . . . with wood of the same character. Texture rather coarse, grain straight, very easy to work, durability IV), cheap and temporary construction, box-lumber, etc. (Schneider).

NOTE.—The juice can be circumvented by sawing two rings through the bark about a foot or more apart, stripping off that bark with a spud, and washing the exposed surface with a solution of carbonate of soda—(F.W.L.).

European timbers quoted.—These seem to be intermediate between Black Poplar (F.W. 8) and Spruce (F.W. 11).

Vernaculars.—171 (U)=B'holliā, B'hollātokī; (Tl) = Jīdi, Nallajīdi; Gudova, Tummadamāmidi; (Ta) = Cēngottai, Cēran, Kālagam, Tagilimā, Viracāgi; (M) = Cēra, Cērkkota; (K) = Gēru, Karigēru, Gērkāyi. 172 (Ta) = Kāttucēngottai, Periyaccēran, Ponnaccēran,

Tēncēran ; (M) = Avukaram, Malancēra, Tēncēra. 173 (Ta) = Māncārai, Vellaiccārai ; (M) Cāri, Ciruccēra. 174, 175 (Ta) = Karuncārai, Kāttuccēran ; (M) = Kāttuccēra, Cēra ; (K) = Holegeru, Kādugēru, Kuttegeru 176 (Ta) = Pālvidiniyan (? see 317, Cat. 23) ; (M) = Cēra Valiyaccēra.

Under 1 *foot diameter of the same category* :—(None.),

Exhibits.—171 (s. panel, l. block). 173 (s. panel, s. block). 174 (panel). 176 (s. panel, s. block).

(8) FIGS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
445. Streblus asper (M.)	41	587	4	4	3	2	IV	All districts, scat.
446. Ficus gibbosa ...	38	443	4	4	4	2	IV	Do. do. do.
447. Ficus bengalensis (M.)	36	600	2	4	3	2	III	Do. do. do. and cult.
448. Ficus mysorensis (M.)	37	...	3	4	4	3	IV	MPLT., WGTS., scat.
449. Ficus tomentosa (M.)	41	...	4	4	4	2	IV	All districts scat.
450. Ficus Beddomei.	...	...	2	4	4	3	IV	WGTS , MBR.-TVY.
451. Ficus altissima.	...	...	2	4	4	3	IV	WGTS., esp. MBR. TRV.
452. Ficus Benjamina (Bn.)	...	...	3	4	4	4	IV	NCCS., (Agt.), WGTS., scat.
453. Ficus Trimeni ...	..	...	2	4	4	4	IV	NCCS. (Agt.), WGTS., scat.
454. Ficus Talboti ...	..	...	3	4	4	4	IV	MBR., TRV.
455. Ficus retusa (M.) (R.)	...	...	4	4	4	3	IV	Most dist. scat. and cult.
456. Ficus nervosa ...	..	...	2	4	4	3	IV	NCCS. (Agt.), WGTS., KAN.-TRV.
457. Ficus Rumphii	27	...	3	5	4	3	IV	NCCS. (Agt.), NLGS.
458. Ficus religiosa (M.)	30	521	3	4	3	2	III	All districts, scat. and cult.
459. Ficus Arnottiana-	...		4	4	4	2	IV	All dist. dry. forests.
460. Ficus tjakela (R.)	30	...	4	4	4	3	IV	MPLT., WGTS.
461. Ficus tsiela	34	...	3	4	4	2	IV	All districts, scat. and cult.
462. Ficus infectoria (M.)	34	...	2	4	4	3	IV	WGTS. and cult.
463. Ficus callosa ...	30		4	4	4	3	IV	MPLT., CNTC., WGTS.
464. Ficus asperrima.	23	345	4	5	4	3	V	NCCS., (Agt.), MPLT., WGTS.
465. Ficus cunia (M) (Bn.)	31	...	4	4	4	4	V	NCCS.
466. Ficus glomerata.	30	570	3	4	4	3	IV	All districts, scat. dry areas.
467. Antiaris toxicaria.	24	...	1	4	4	3	III	WGTS., CRG.-TRV., Anms.

Uses.—(Very little used with the exception of the following). 445 (tough, often gnarled and might do for "figured Beech—F.W.—31 or Maple"—F.W. 55) cart-wheels (Bed. Gbl.). 447 Well-curbs, boxes, door-panels, furniture, cart-yokes and cavady-poles (Bs. Gbl.). 455 Furniture (Gbl.). 358 Packing-cases (Bs. Gbl.). 366 well-frames (Gbl.).

NOTE.—The size class of these Figs. has been discounted because the basal portion is often incapable of being used, being a mass of disconnected roots not furnishing proper timber; branchwood is often very large furnishing good timber.

European timbers quoted.—The resemblance of the structure to that of Spruce (F.W. 11) grown on mountains has been mentioned; in uses it also resembles; at the same time, the fact that most, if not all, do under water (well—curbs and frames) indicates their similarity to Beech (F.W. 31).

Vernaculars.—445 (U) = Sāhādā; (Tl) = Barinika, Kukkabēdi, Pakki, Sitanike; (Ta) = Kurrippirāy, Kurrippillā, Pacunā, Pirāy; (M) = Paruva, Tīntapparuva; (K) = Mitala, Ponalige, Timli, Mitle. 446 (U) = Korotosānī; (Tl) = Kappa, Karāsa, Pindi, Kondajuvvi, Tellabarinika; (Ta) = Itti, Kallitti, Kāttitti, Iradagam, Iratti, Kuruvēru; (M) = Itti, Kallitti, Kuruvāl, Attimirāl; (K) = Goddumitle, Kajjigōli. 447 (U) = Boro, Boto; (Tl) = Marri; (Ta) = A'l, Pēral; (M) = A'l, Pēral; (K) = A'la, Gōli. 448 (Ta) = Kallāla; (M) = Kōli, A'nakkōli, Kāttāl, A'la; (K) = Gōli, Gōni, Attakagōli, Biligōli. Habbugōli, Kottegōli. 449 (Tl) = Kaljuvvi, Kalatti, Kondakalajuvvi, Kondamarri, Pittamarri; (Ta) = Kalatti, Karbādī; (M) = Kallāl; (K) = Kādugōni, Kallāla, Kallatti. 450 (M) = A'nakkōli, A'nakkoyāli, Tavitāl. 451 (Ta) = Pudālam, Kallatti; (M) = Valiyakkōli, Vellakkōli. 452 (U) = Jodi; (Tl) = Kondagolugu, Kondajuvvi, Putrajuvvi; (M) = Vellāl. 453 (K) = Hebbasari. 454 (Ta) = Itti, Kalitti. 455 (Tl) = Kondapillara, Nandirēka, Billajuvvi, Hēmōdaga, Verrijuvvi; (Ta) = Icci,

Kallicci, Malaiyicci ; (M) = Ittiyāl ; (K) = Hināla, Hillāla, Kirugōli. 456 (Tl) = Vonjar ; (Ta) = Nīrāl ; (M) = Iccam, Ceriyaccūta. 457 (K) = Bettarāgi, Kādarali. 458 (U) = Usto, Oswott'ho ; (Tl) = Rāvi, Asvatt'hamu, Bod'hi ; (Ta) = Arasu, Arayāl, Acuvatt'ham ; (M) = Aracu, Arayāl Asvatt'ham, Caladalam ; (K) = Arase, Arali, Asvatt'ha, Basari, Ragi. 459 (U) = Plok Myo ; (Tl) = Kondarāvi, Kallarāvi ; (Ta) = Kāgōli, Kodiyaracu, Kollaracu ; (M) = A'makanniyam, Kallarayāl ; (K) = Bettadarali, Kādarase, Kādasvatt'ha, Kallarase. 460 (Ta) = Kallāl, Kurugatti, Kurugu ; (M) = Cakkila, Cuvannāl, Kārāl, Cōrakkōli ; (K) = Basari, Kappabasari, Karibasari, Māki, Selavāla. 461 (U) = Jori ; (Tl) = Juvvi, Peddajuvvi, Pittajuvvi ; (Ta) = Cēlaikkallicci, Cirrāl, Icci, Kallicci. 462 (U) = Pākodo, Rushorconā ; (Tl) = Badijuvvi, Jati, Juvvi ; (Ta) = Cuvi, Kallāl, Kurugatti, Kurugu ; (M) = Billukkōli Bākni, Cakkila, Cuvannāl, Itti, Jatti ; (K) = Basari, Basarigōli, Karibasari, Kabbasari, Juvvi. 463 (Ta) = Kōliyāl ; (M) = Valiyaccūta, Nāccūta, Neyapuram ; (K) = Nīratti, Takadugōli. 464 (U) = Korotosāno ; (Tl) = Karasāna, Karakabodda, Siribodda ; (Ta) = Imbarattān, Malandiniyatti ; (M) = O'laparūm, Tērekam ; (K) = Garagasayele, Garagatti. 465 (U) = Godimā ; (Tl) = Bommamarri, E'rubodda ; (Ta) = Taragadi ; (M) = Tontittērakam, Pārōm, Perintērakam ; (K) = Garagasa. 466 (U) = Dimiri, Dumuro ; (Tl) = Atti, Medi, Paidi ; (Ta) = Atti, A'rā, Kōli ; (M) = Atti, Attiyāl ; (K) = Atti. 467 (Ta) = Arandali, Ali, Nettāvil, Maravuri ; (M) = Arayānnili, A'rannili, Nettāvil ; (K) = Ajanapatti, Aranyapatti Bairi, Jajjuri.

Under 1 *foot diameter of the same category*:—623, 624, 639, 773, 810.

Exhibits.—447 (s. panel, l. block). 448 (l. and s. panel, l. and s. block). 450 (l. and s. panel, s. block). 451 (l. and s. panel, s. block). 455 (s. panel, l. block). 456 (s. panel, l. and s. block). 458 (s. panel, l. block). 460

(l. panel, s. block). 461 (s. panel l. block). 464 (l. panel). 466 (l. and s. panel, l. and s. block). 467 (l. and s. panel, l. and s. block).

(9) CADAMBA-WOODS.—

	W.	P.	S.	D.	U.	A	VC.	Localities.
234. Blepharistemma corymbosum.	42	574	3	3	3	3	III	WGTS., CRG.-TRV.
287. Mastixia arborea.	31	452	3	4	3	3	IV	WFTS., esp. NLGS., CBT.
288. Mastixia pentandra.	27	331	3	4	3	3	IV	WFTS., KAN.-TRV.
290. Sarcocephalus missionis.	37	450	4	3	3	3	IV	WTCT., KAN.-TRVGR., Rvrs.
291. Anthocephalus cadamba.	40	698	3	3	2	3	III	WTCT., Rvrs.
292. Adina cordifolia (M) (Y).	45	616	1	3	2	2	II	Most districts.
293. Stephegyne parvifolia (M) PkBn.	43	642	3	3	2	2	III	Most districts.
294. Stephegyne tubulosa.	...	...	..	...	...	...	...	......
295. Nauclea purpurea (M) (Pk).	45	...	4	3	3	4	IV	NCCS., WGTS., scat.
296. Hymenodictyon excelsum.	31	447	4	3	3	2	III	Most districts.
297. Hymenodictyon obovatum.	28	...	4	3	3	4	IV	MPLT., WGTS., scat.
312. Morinda tinctoria (M) (Y-Pk).	30	410	4	3	3	2	III	Most districts.
358. Salvadora persica (W).	42	..	4	3	3	4	IV	COCT., DKN., CNTC., scat.

Uses.—234 (fissile), 287, 288, 290, 295, 358 (very little used—Bed. Bs. Gbl.). 291 (brittle), beams and rafters, a good joiners wood (Bs. Gbl.). 292 (seasons well, works easily, takes a good polish, somewhat liable to warp and crack, not attacked by insects, building purposes, construction, house carpentry, planking, furniture, chests, opium-boxes, agricultural implements, gun-stocks, writing-tablets, combs and articles of small turnery, dugout canoes (Bed. Bs. Gbl.). 293, 294 building, cabinet-making and furniture, planking, agricultural implements, gun-stocks, turned and carved article-combs, cups, platters, spoons, etc. (Bed. Bs. Gbl. Kurz. Bdn.). 296 cabinet-making, palanquins, packing-cases'

black-boards and school-slates, tea-boxes, agricultural implements, gun-stocks, grain-measures, scabbards, toys (Bed. Bs. Gbl.). 297 (used for a variety of purposes and is probably equal to the last, 296—Bed.). 312 (durable, easily worked, takes a fine polish), Gun-stocks, fancy-work, wooden shoes, plates and dishes (Bed. Bs. Gbl. Kurz).

European timbers quoted.—This category seems intermediate between the Silver Fir (F.W. 10) and the Birch (F.W. 26), in structure and in mode of utilization; it makes an excellent category for joinery, cabinet and fancy-work. Schneider gives:—"Softer-House-posts, framing, siding, ceiling, etc., carved ornamental work, bearings of cart-axles, boats, furniture, cabinet-work, sculpture; Harder-Posts, beams, joists, rafters, and all other structural timbers, bridge and wharf building, a favourite for flooring, and windowsills in the better class provincial houses, turned and shaped tool-handles, plane-stocks, etc., furniture and cabinet-work, recommended for bobbins, shuttles, etc."

Vernaculars.—234 (M) = Nirkkurunta. 287, 288 (Ta) = Velliccai. 290 (Ta) = A'rruvanci; (M) = A'rruvanni, Pulamannal; (K) = A'nāvu, Holehalasu. 291 (U) = Kodombo, Kodomo, Holiptiyā; (Tl) = Kadambamu, Mogulukadimi, Nīpamu; (Ta) = Kadambu, Vellaikkadambu; Kadappai; (M) = A'rruttekku, Katampa, Kāttuccakka, Vellakkatampa; (K) = Kadamba, Bale. 292 (U) = Holondo, Kelibodombo; (Tl) = Bandāru, Dāduga, Kamba, Paccabōtruga, Paccaganapa; (Ta) = Kadambai, Mancadgadambai; (M) = Bīmbu, Katampa, Mannakkatampa, Pītampu; (K)=A'nāvu, Arasinatige, Doddakadaga, Heretege, Paccenike. 293, 294 (U) = Mundāmundi; (Tl) = Bōtruga, Bottaganapa, Bottakadapa, Nīrukadimi, Pulakadimi; (Ta) = Chinnakkadambu, Nīrkkadambu, Pattakkadambu; (M) = Nirkkatampa, Sirakkatampa; Malantampa; (K) = Hedu, Kadamba, Nāyikadamba,

Nīrkadamba, Sannakadamba. 295 (Tl) = Begada; (Ta) = Nīrkkadambu; (M) = Kāttuccakka. 296, 297 (U) = Bod'hikā, G'hono, Mundiōholo, Rongobod'hikā; (Tl) = Bandāru, Cēdippa, Duvvudippe, Manuvubillu; (Ta) = Malaittanakku, Ilaimērgāy, Nāykkadambu, Peruncēli, Vellaikkadambu; (M) = Ittiyila, Malankalli, Nicakkatampa, Perantōli, Vallāri, Vellakkatampa; (K) = Battaga, Dōli, Gandele. 312 (U) = A'cu; (Tl) = Maddi, Bandamaddi, Togaru, Mogali; (Ta) = Mancanārri, Mancanunā, Nuna; (M) = Mannanārri, Karrapitalavam; (K) = Maddi, Molagu. 358 (U) = Kotungo, Toboto; (Tl) = Gōne, Kārugōgu, Peddavaragōgu, Varagōgu; (Ta) = Cirugalarvā, Cittuilā, Perungōli, Perungōni, Ugā; (K) = Gōni.

Under 1 *foot diameter of the same category*:—693.

Exhibits.—287 (s. panel, l. block). 290 (l. and s. panel, l. and s. block). 292 (l. and s. panel, l. block). 293 (l. and s. panel, l. and s. block). 296 (s. panel, l. block). 312 (l. and s. panel, l. and s. block).

D.—Over 20 *lb. White or Pale-tinted.*

(10) SOFT LINDENS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
87. Grewia laevigata.	36	...	5	4	3	2	IV	Most dist. scat.
88. Grewia microcos.	51	...	4	4	3	3	IV	WGTS., KAN.-TRV.
89. Elaeocarpus Ganitrus.	28	...	4	4	3	4	IV	KAN.
90. Elaeocarpus serratus.	30	508	4	4	3	3	IV	WGTS., NLGS, KAN.-TRY.
91. Elaeocarpus lanceaefolius.	41	..	4	4	3	4	IV	KAN.
92. Elaeocarpus oblongus.	...	...	3	4	3	3	IV	WFTS., KAN.-TRV., NLGS., Anms.
93. Elaeocarpus amoenus.	.	...	4	4	3	3	IV	WFTS, KAN., MBR., Anms.
94. Elaeocarpus tuberculatus (M).	33	400	2	4	3	3	III	WGTS., CRG.-TRV., MYS., NLGS.
95. Elaeocarpus aristatus.	...	...		...	.	...	...	
96. Elaeocarpus rugosus.		...	2	4	3	4	IV	? CRG., NLGS. ?
97. Elaeocarpus ferrugineus.	.	...	4	4	3	3	IV	NLGS., Anms, Pnis., TRV.
98. Elaeocarpus Munronii (M).	...	...	3	4	3	3	IV	WGTS, CRG.-TRV., NLGS.

European timbers quoted.—Linden (F.W. 2); perhaps more akin to the Birch (F.W. 26), should be very good for joinery, etc., purposes.

Uses.—(Although tough and to a certain degree elastic, very little used, but occasionally.) 91, 92, 94, 97, Building (Bed. Gbl.).

Vernaculars.—(U) = Kulokāt'hi; (Tl) = Allipayaru, Kotirike, Potirike; (Ta) = Naraittai, Pīrunnu, Tavunnu, Uduppai; (K) = Jāvanigala, Kargele, Murige. 88 (Ta) = Kadambu, Vicālam; (M) = Kottakka; (K) = Ab'hrāngu, Biliyab'hrāngu, Majjigesoppu. 89 (Ta) = Akkam, Uruttirādcam; (M) = Rudrāksham; (K) = Rudrāksha. 90 (Ta) = Ulungārai, Uruttirādcam; (M) = A'vil, Kārumāvu, Nallakkāra, Perunkāra, Valiyakkāra; (K) = Bīgada, Gudderenge. 91 (K) = Bīgada, Guddarenge. 92 (Ta) = Kattukkārai; (M) = Kattakkāra, Malankāra; (K) = Bikki, Hennalatade. 93 (Ta) = Nagarai, Narul; (M) = Barali; (K) = Gurumani, Maratugurumani. 94, 95 (Ta) = Uruttirādcam, Pagumbal, Nāvāti, Pulāndi; (M) = Totayam, Ammakkaram, Kotuvāsi; (K) = Dandele, Rudrāksha. 96, 97 (no names known). 98 (Ta) = Milaicciriyan; (M) = Punkāra; (K) = Kalbikki, Nāribikki.

Under 1 *foot diameter of the same category*:—502, 503 and 517.

Exhibits.—87 (s. panel, l. block). 90 (l. and s. panel, s. block). 92 (l. and s. panel, l. and s. block). 97 (l. panel). 98 (l. and s. panel, l. block).

(II). FLOAT WOODS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
62. Kydia calycina...	36	...	4	4	3	2	IV	Most dist. except atts.
63. Bombax malabaricum.	23	650	1	4	3	2	III	All dist.
64. Bombax insigne.	21	180	4	5	4	3	V	WTCT., plains KAN.-TRV.
66. Sterculia foetida.	28	464	2	5	3	4	IV	WTCT., scat.
70. Sterculia colorata.	29	...	4	5	4	3	V	NCCS.-CNTC., dtts. scat.

	W.	P.	S.	D.	U.	A.	VC.	Localities.
71. Sterculia alata ...	31	613	1	4	3	3	III	WTCT., KAN.-TVY., common.
105. Ailanthus excelsa.	25	..	3	4	3	3	IV	NCCS.-CNTC., scat.
106. Ailanthus malabarica.	23	...	3	5	4	3	IV	WGTS., KAN.-TVY., Anms.
183. Butea frondosa...	36	335	3	4	3	2	III	Most dist. both.
243. Gyrocarpus Jacquini.	22	...	4	4	3	2	IV	Most dist. dry forests.
269. Barringtonia racemosa.	27	302	5	5	4	3	V	WTCT., litl., sswp.
283. Tetrameles nudiflora.	24	321	1	4	3	3	III	WFTS., esp. NLGS., KAN., TRV.

Uses.—62 (Elastic), building, ploughs, oars, carving (Bs. Bed. Kurz.). 63, 64 (the latter is the inferior White Pula of Malabar growing in the plains, the former the Red Pula of the hills which is far superior; only durable under water; for planking, the tree should be sawn up green and the planks sawn up separately), lining of wells, planking, packing-cases, tea-boxes, coffins, scabbards, toys, fishing-floats (Bs. Gbl. Kurz.). 66 (easy to work, not liable to split, takes an indifferent polish), house-building, canoes, packing-cases (Bed. Gbl. Kurz.). 70, ordinary agricultural work (Bs.). 71 (no uses recorded; wood is practically identical with 283, and probably a great deal of what is brought in as Chīni is really this timber). 105 door-panels, planking (A.W.L.), catamarans, sword-handles, spear-sheaths, fishing-floats (Bs. Bed. Gbl.). 106 (not used). 183 (durable under water, not so above ground, readily eaten by insects, and for planking requires the same treatment as 63), common house-building, well curbs, piles, water-scoops, planking, rough boxes (Bed. Bs. Gbl. Kurz.). 243 (takes paint and varnish well), catamarans, boxes, toys (Bed. Gbl.). 269 (works with good even surface), house-building, cart-framing (Bed.); but Bs. and Gbl. doubt this; its P, however, does not indicate such an inferior wood as Bs. and Gbl. would seem to imply. 283, planking, boxes, packing-cases, tea-chests, dug-out canoes (Gbl. Bdn.).

European woods quoted.—This category does not fit in altogether with any of the European woods, but it might perhaps be considered as an intermediate between the Spruce (F.W. 11) and Alder (F.W. 19); the woods here seem to have the structure of the Alder represented by prominent medullary rays and its special quality of lasting better under water than out of it, whilst the appropriateness of them for planking and box-lumber connect them with the Spruce.

Vernaculars.—62 (U) = Kopāsyā, B'hārimo; (Tl) = Pōtari, Kondapōtari, Peddakunji, Pandiki, Erukutada; (Ta) = Vendai; (M) = Velukku, Venta; (K) = Belagu, Bende, Kādubende, Kolibende, Nāyibende. 63 (U) = Buro, Simuli, Sālmali, Mocoroso; (Tl) = Būraga, Mundlabūraga; (Ta) = Ilavam, Ilavu, Kōngu, Mullilavu, Pūlai; (M) = Pūla, Ilavu; (K) = Būraga, Kempubūraga, Mullubūraga, Elava. 64 (Ta) = Kāttilavu, Pāraiyilavu; (M) = Kāttuppūla, Kallilavu, Pārayilavu. 66 (Tl) = Gurrapabādamu, Manciponaku, Piyyatiponaku; (Ta) = Kuduraippidukkan, Malaittīngāy, Pīnāri; (M) = Pīnāri, Pottukkāvalam; (K) = B'hutaili, Gōtinakāyi, Jēnukā-yitaili, Kuduregōtu. 70 (Tl) = Kārupāyu, Kāricicce, Gudilapu, Kondatāmara, Kōdijuttu; (Ta) = Malambarutti; (M) = Malamparatti; (K) = Bilisulige, Kodokili. 71 (Ta) = Ānaittondi, Kōdaittondi; (M) = Peru, Pī, Porila, Poruttonti, Ānattonti. 105 (U) = Gorimākābbā, Mahānimbo, Yoli; (Tl) = Peddamānu, Peddamandu, Reyyavēpa; (Ta) = Pī, Peruppi, Peru Agal, Naru; (K) = Bende, Dodda, Doddabēvu, Hem, Hire. 106 (Ta) = Mattippālai, Pongiliyam; (M) = Mattippālam, Mattipponnalayam, Pātattavetti, Ponnalayam; (K) = Dūpa, Baggadadūpa, Maddidūpa, Uguludūpa. 183 (U) = Polāso, Kinsuko; (Tl) = Moduga, Tellamoduga, Togaramoduga; (Ta) = Murukku, Kāttumurukku, Punamurukku, Puracu, Vellaippuracu; (M) = Camata, Palācincamata, Mukkampūyam, Murikku, Palāsi,

Pūppalāsi; (K) = Muttaga, Muttula, Palāsu. 243 (U) = Pitulā, Sutorno; (Tl) = Ponaku, Nallaponaku, Kummaraponaku, Tanuku, Mettamāmi; (Ta) = Tanakku, Kottaittanakku, Vellaittanakku, Muttaikkōngu; (K) = Bende, Kādubende, Pollika. 269 (Ta) = Camuttirak-kadambu, Camuttirappalam; (M) = Samstravati, Samudrāccam, Samudrappū; (K) = Samudrap'hala, Kempuganigalu. 283 (Ta) = Cīni, Cōlai, Pīyai; (M) = Cīni, Vellaccīni, Vellappacca; (K) = Bōlu, Erimali, Kādubende.

Under I *foot diameter of the same category*:—518, 570, 633, 717, 718, 719, 769, 770 and 812.

Exhibits.—62 (l. and s. panel, l. and s. block). 63 (l. and s. panel). 64 (s. panel, l. block). 66 (s. panel, l. block). 71 (l. and s. panel, l. and s. block). 105 (l. panel, l. and s. block). 106 (l. panel). 183 (l. and s. panel, l. and s. block). 243 (l. and s. panel, l. and s. block). 283 (l. panel).

(12) Soft Hollies—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
140. Ilex denticulata malabarica.	36	...	3	4	4	3	IV	WGTS., CRG.-TRV., NLGS., MYS., Anms., Pnis.
141. Ilex Wightiana...	37	.	2	4	4	3	IV	WGTS., NLGS.-TRV., Anms., Pnis.
144. Microtropis ramiflora.	...	...	4	4	4	3	IV	NLGS., Anms., Pnis.
160. Turpinia pomifera.	30	...	3	4	4	2	IV	WFTS., NLGS.-TRV., Anms., Pnis.
346. Symplocos spicata.	...	..	...	..	...	...	...	NCCS. (Agt.), WFTS., esp. NLGS.
347. Symplocos kurgensis Warburgi.	34 to 40	...	...	...	...	...	...	CRG., NLGS.
348. Symplocos macrocarpa.	...	...	4	4	4	3	IV	TRV., TVY.
349. Symplocos Gardneriana.	...	...	...	...	..	...	...	WGTS., NLGS.-TRV., Anms.
350. Symplocos Beddomei.	...	...	...	...	...	...	...	CDP., CRG., KAN.
351. Symplocos foliosa.	37	...	...	...	..	..	...	NLGS.
352. Symplocos obtusa.	...	...	...	.	...	...	...	NLGS., Anms.

Uses.—(Hardly any of them used, except). 141, Building, cabinet-work, bowls and platters (Bed. Gbl.). 347, Rough house posts (Bed. Gbl.).

European timbers quoted.—Holly (F.W. 57) has much the same structure, but whereas that is hard, these are all soft; nevertheless, they would do perfectly well for cabinet—and fancy—work like the Holly.

Vernaculars.—140, 347, 351, 352 (names unknown). 141 (Ta) = Velludai; (K) = Hurulu. 160 (Ta) = Kanali, Pambavetti, Canda; (M) = Kāttambālam, Palukku, Cānda; (K) = Nīlā. 346 (Ta) = Kamblivetti, Paralai; (M) = Nānnal, Pāccotti; (K) = Būdigane, Loddi, Balaloddi. 348 (Ta) = Paralai; (M) = Malaparala. 349 (K) = Sankani. 350 (Ta) = Nillamarri.

Under 1 *foot diameter of the same category*:—569, 571, 572, 730 and 740.

Exhibits.—140 (l. and s. panel, l. and s. block of each). 141 (l. and s. panel, l. and s. block). 169 (½ and s. panel, l. and s. block). 346 (l. and s. panel, l. block). 349 (½ and s. panel, l. and s. block). 351 (l. panel, s. block).

(13)—Croton Birches—

	i. Lighter.	W.	P.	S.	D.	U.	A.	VC.	Localities.
435.	Ostodes zeylanica.	26	421	4	4	4	3	IV	WFTS., KAN.-TRV., Anms., Pnis.
436.	Trewia nudiflora polycarpa.	29	...	2	4	4	3	IV	Most d st., rvrs., scat.
437.	Mallotus albus ...	25	...	4	4	4	2	IV	WGTS., KAN.-TRV., common.
440.	Macaranga indica Roxburghii.	25	403	3	4	4	2	IV	Many dist. scat. WGTS., common.
	ii. Heavier.								
22.	Crataeva religiosa.	40	..	5	4	4	2	IV	Most districts.
159.	Harpullia cupanioides.	40	530	2	4	4	3	IV	WFTS., KAN.-TVY.
412.	Litsaea polyantha.	38	...	4	4	4	4	V	NCCS.
434.	Givotia rottleriformis.	36	..	5	4	4	2	IV	Most districts, dtts.
439.	Cleidion javanicum.	34	452	3	4	4	3	IV	WFTS., KAN.-TRV., NLGS., Anms.

Uses.—22 (fairly tough, not durable—durable, Bs.—liable to attacks of boring beetles, easy to work), turnery, boxes, drums, models (Bs. Gbl). 159 (not used). 412 (not durable, readily attacked by insects), agricultural implements; "Soft Litsaea (creamy-white easily stain-"ing to greenish-grey or light brown, and readily "attacked by insects, if not rapidly seasoned, except for "staining seasons very well, very easy to work, rather "coarse but takes a smooth somewhat glossy surface "under sharp tools), carving and sculpture, ceiling and "sheathing, musical instruments, cabinet-work, pyro-"graphy" (Schneider). 434 (takes paint and varnish very well), carving-figures, toys, imitation fruit, theatrical masks, boxes, catamarans (Bed. Gbl.). 435 (perishable, white-ants eat it—Bdn.), in use for ordinary work in Ceylon (Bed.). 436 (like most of the soft white woods, it has to be cut up when green and seasoned in dry air, if it is to retain its white colour, and not get discoloured of a muddy grey—Gbl.—after proper seasoning, found to be an excellent wood in Calicut—A.W.L.), carved images, drums, agricultural implement (Bs. Gbl. Bdn). 437 (perishable, liable to attacks of insects and worthless —Bdn.), "Endospermum (similar wood) matches and match-box veneer, wooden shoes, sticks for cheap umbrellas" (Schneider). 439 (perishable, etc. see 437—Bdn.—takes a good polish—Kurz), building (? temporary) (Bed.). 440, cabinet-work (Kurz.), temporary huts (tea-boxes—Gbl.).

European timbers quoted.—Birch (F.W. 26) and Black Poplar (F.W. 9); the woods very much resemble these two, and instead of being "worthless," can be put to a number of useful purposes; European woods are perishable and liable to insect attack, but that does not disqualify them from being used to the utmost.

Vernaculars.—Lighter. 435 (K) = Sotige. 436 (U) = Mondā, Pit'hāliyā ; (Tl) = E'ruponaku ; (Ta) = A'rraracu, A'rruppūvaracu, Cannattuvarai, Kānci, Nākkumil ; (M) = Pongati, Kānci, Kattukkumil, Malankumil, Pāmarakkumil ; (K) = Kādukānci, Kādukēre, Kādukumbala, Kānci. 437 (Ta) = Mulluppolavu ; (M) = Kuttili, Kāttukkurukkutti, Payamparal, 'attakkumil ; (K) = Kukkuti, Tambittu, Uppila. 440 (U) Podmopornni ; (Tl) = Boddi, Puttatāmara, Kondatāmara, Kondajāp'-hara, Pulicinculamu ; (Ta) = Kandubārangi, Pottudāmarai, Vattadāmarai, Vattikkanni, Vattittutti, Pīmugam ; (M) = Pattattāmara, Pattavanni, Uppila, Vattattāmara ; (K) = Uppalige, Bettadavare, Kancupparānti. Heavier. 22 (U) = Boryno ; (Tl) = Peddamagalingamu, Magalingamu, Ulimidi, Bilvaramu, Marēdu, Usiki ; (Ta) = Mavilingai, Nirumāliyam, Mālāram, 'illuvam ; (M) = Kili, Niravila, Nirumāliyam ; (K) = Bilpatre, Tudemadirengi, Hoddelenage, Nerajani, Neravele, Vittasi, Mavilinga. 159 (Ta) = Neykkottai ; (M) = Pūkkolli, Cirrilamatukku. 412 (U) = Kulyā, Kukkuroc'hodiyā, Māyāc'-hodiyā ; (Tl) = Mida, Nāra Naramāmidi. 434 (Tl) = Kondaponaku, Pitryponaku, Ponaku, Tellaponaku ; (Ta) = Cambarittanakku, Cendanakku, Polukki, Pūdaralai, Pūttāli, Vendanakku, Vendāli ; (K) = Bilitāle, Būditāle, Polike. 439 (Ta) = Vellarai ; (M) = I'yalari ; (K) = Niya.

Under 1 foot diameter of the same category:—473, 478, 508, 515, 516, 537, 538, 539, 565, 566, 567, 608, 609, 616, 617, 618, 619, 620, 634, 647, 648, 649, 660, 661, 675, 677, 687-bis, 743, 744, 750, 751, 752, 756, 758, 763 and 764.

Exhibits.—22 (f. panel, l. block). 159 (s. panel, s. block). 436 (l. and s. panel, l. and s. block). 437 (s. panel, l. and s. block). 439 (l. and s. panel, l. and s. block). 440 (s. panel, l. block).

(14) GUTTA DEALS—

	W	P.	S	D.	U.	A.	V.C.	Localities.
314. Chrysophyllum Roxburghii.	37	628	3	4	3	3	IV	WFTS., KAN.-TRV., Anms.
359. Alstonia scholaris.	31	563	2	4	3	2	III	WFTS. abdt.
360. Tabernaemontana dichotoma.		..	4	4	3	3	IV	WGTS., KAN.-TVY.
361. Tabernaemontana Heyneana.	35	359	4	4	3	3	IV	WGTS., KAN.-TRV.
362. Wrightia tinctoria (M).	49	...	4	4	3	2	IV	Most districts, dtts.
363. Wrightia tomentosa (M).	39	..	4	4	3	2	IV	Most districts.
417. Euphorbia antiquorum.	30	...	5	5	4	2	V	Most dist. esp. NEL-MRA.
441. Sapium insigne.	28	...	3	4	3	4	IV	WGTS. scat.
472. Podocarpus latifolia (M).	32	...	3	3	3	4	IV	TVY., TRV., scat.

Uses.—No uses are given for: 360, 361, 417, 472. As regards the last, as the growth of the genus generally is said to be slow—about 15 rings per inch of radius—it would probably do as well for sounding boards for musical instruments as the besy Spruce in which the growth is 1, 5-2. milliometres (1-16 to 1-12 inch) which realizes Rs. 5 to Rs. 7 per c. ft. 472 is scattered, but at this rate it is worth developing. As regards 360 and 361, for cognate species with practically identical wood, Schneider gives:—light constructions—joists, rafters, flooring, ceilings, furniture and cabinet-ware, bottoms and sides of drawers and backs of sideboards, shelves, carved and turned articles, carved jewel boxes, picture frames, household implements, wash-bowls, wooden shoes, matches, pyrography panels, musical instruments (necks, heads and trimmings) drawing boards, kitchen utensils, scabbards, etc. 314 (fissile, bored by beetles), building and shingles (Gbl. Bdn.). 359 (perishable and attacked by beetles, easily worked), beams, planking, furniture, packing cases, trunks, boxes, coffins, blackboards,

sheaths and scabbards, turnery (Bs. Gbl. Kurz.). 362 (pure white like ivory, cuts like soap over a lathe turning and carving (Bed. Bs. Gbl. Kurz.). 363, turning and carving, bowls, plates, combs (Bs.). 441, cylinders of tom toms (Bed. Bs. Gbl.); (the wood of 417 is much the same as this—A.W.L.).

European timbers quoted.—The white deals are Silver Fir (F.W. 10) and Spruce (F.W. 11), and this category resembles them much.

Vernaculars.—314 (Ta) = Karabālai, Kāttiluppai; (M) = A'tta, Pāla, Pāliccukka Pāliccakka; (G) = Hāle; 359 (U) = C'hotinā, Kumbāro, Soptoposi; (Tl) = E'dākula-pāla, E'dākulaponna, E'dākularati, Pālagaruda; (Ta) = E'lilaippālai, Pālai, Maranalari; (M)=Pāla, Daivappala, E'lilampāla, Kotappāla, Mangalappāla; (K) = E'lelehāle, Hāle, Jantrahāle, Koduhāle, Mudihāle. 360 (Ta)=Kanda-laippālai, Kāttalari, Pālai (M)=KunnampālaUtrlam. 361 (M) = Pāla, Kunnampāla; (K) = Madarasa. 362 (U) = Dud'hokryā, Kryā; (Tl) = Ankudu, Cittankudu, Pālabaranki, Pālavarēni Pālunili Rēpāla Tedlapāla; (Ta)=Irumbālai, Kumbambālai, Nilambālai, Pālai, Veppālai; (M) = Ayyappāla, Irumpāla, Kotakkappāla, Pāla; (K)=Beppāle Hāle, Hallunovu Hālugale, Kādunili Kodasipe. 363 (U)= Kudelo, Dud'hokryā, Pāhukryā; (Tl)=Kolamuk'hi, Pālai, Peddapāla, Puttucheyavalaru, Tedlapāla; (Ta) = Conaivedbālai, Pālai, Tondambālai, Vedbalai; (M) = Mayilappāla, Nettampāla, Nilampāla. 417 (U) = Dokāhānāsiju, Lohāsiju; (Tl) = Bommajemmudu, Bontajemmudu, Bontakalli, Peddajemmudu; (Ta) = Cadurakkalli, Kalli, Amudangam, Cuddācci; (M)=Caturakkali, Kalli, Kattakkalli; (K)=Bontegalli, Caturakalli, Jadekalli, Mundugalli. 441 (Tl) = Garb'hasula; (Ta) = Karuppucculai; (K)=Kannupade. 472 (Ta) = Narumbili; (M) = Karuntupi.

Under 1 foot diameter of the same category.—741, 746, 747, 748, 749, 753, 754, 804, 805 and 806.

Exhibits.—359 (l. block). 362. (s. panel l and s. block). 863. (l. and s. panel. l. & s. block.) 417. (s. block.) 472. (s. panel, l block.)

(15) False Deals—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
28. Hydnocarpus Wightiana.	33	464	2	4	4	2	III	WTCT., KAN.-TRV., ANMS.
30. Asteriastigma macrocarpum.	36	456	4	4	4	3	IV	TRV., TVY., Mys.
148. Kurrimia bipartita.	40	505	3	4	4	3	IV	TRV., TVY., Anms.
277. Sonneratia acida.	36	...	4	4	4	3	IV	WTCT., KAN.-TRV.
371. Dolichandrone Rheedii.	35	...	3	4	4	4	IV	WTCT., MBR., TRV.
431. Daphniphylium glaucescens.	40	...	4	4	4	3	IV	WFTS., esp. NLGS., Anms., Pnis.

Uses.—(Practically unused with the exception of). 277. Models, (Bed. Gbl.) With these there is no resinous juice as in the last category, otherwise the structure and qualifications are practically the same. "Soft Dolichandrone: wooden shoe-soles, handles of kitchen and "other household utensils, and of cheap bolos" (Schneider); in other words, all of these are suitable for common turnery and similar modes of utilization.

European timbers quoted.—White Deals are Silver Fir (F.W. 10) and spruce (F.W. 11); these, like the last category, approximate the qualities of White Deals, and their minor uses.

Vernaculars.—28 (Ta) = Maravattai, Nīradimuttu, Nīrvetti; (M) = Nīralam, Nirvetti, Maravetti, Vetti; (K)= Gạrudup'hala, B'hutahi, Nīradivittulu, Surante. 30 (Ta)= Vellaināngu; (M) = Aileyam, Vellanangu; (K)=Doddasurante. 148 (Ta) = Kadappilā, Perungarandam. 277 (Ta)=Kinnai; (M) = Tirala, Vilātti; (K)=Kandele. 371 (Ta) = A'rrukkombudi, Kanbillai, Peruppmbādiri, Virbādiri; (M) = Nírpponālyam. 431 (Ta) = Colluvan; (K) = Nīrjappe, Nirkakke.

Under 1 *foot diameter of the same category.*—552, 568, 578, 607, 613, 627, 684, 687, 688, 688-bis, 689, 695, 723, 732, 734.

Exhibits.—28 (s. panel, l and s. block.)

II.—Mostly Moderately Hard.

A.—Reddish.

(16) Beech Poons—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
1. Dillenia indica.	44	721	4	2	1	3	III	WFTS., KAN., MBR., ANMS., scat.
2. Dillenia bracteata.	..	..	4	2	1	4	III	CDP., NAC., CPT., CBT., MYS., scat.
3. Dillenia pentagyna	50	751	3	2	1	2	III	NCCS., KNL., WGTS., common.
233. Carallia integerrima (II).	47	718	3	3	1	3	III	WGTS., esp. CRG., KAN.

Uses.—1 (Red specked with white, turns jet-black soaked in water, and lasts many years), house-and-ship-construction, gun-stocks, helves (Bed. Bs. Gbl.). 2 (no uses given). 3 (strong, tough, durable even underground, but liable to warp and crack, has much the character of Beech, Redgrey to Red-brown), house-and ship-construction, cabinet-work, rice-mills (Bed. Bs. Gbl. Kurz); "Dillenia (excepting a wide range of colour, from a light brick-red to very dark reddish-brown, the wood of all species is practically identical in general appearance as well as in structure; seasons well, checking and warping very little, difficult to saw but otherwise fairly easy to work), beautiful veneer, cabinet-work (excellent), posts above stumps, beams, joists, rafters, flooring, sheathing and ceiling, furniture, musical instruments, impregnated paving-blocks, and mine-timbers (Schneider). 233 (Hard, pale to dark orange or red, not durable, brittle, fissile, not easily worked, = Bed. Gbl. Bdn.; very conspicuous silver-grain, a very pretty easily worked durable cabinet-wood, durability under severe conditions probably not high but

not attacked by beetles, seasons with little checking and warping (Schneider), cabinet-work, furniture, fittings, planking (Bed. Bs. Gbl. Schneider), also (Sch.) musical instruments.

European timbers quoted.—Beech (F.W. 31) and Elm (F.W. 46) seem to be the nearest approach to these; with Beech they have the prominent silver-grain and durability under water, with Elm they have the durability under ground and qualifications for construction, but with a far higher transverse strength, indeed higher than that of Oak (F.W. 44).

Vernaculars.—1 (U) = Cālotā, Ōū; (Tl) = Kalinga, Peddakalinga, Uvva; (Ta)=Akku, Ugākkāy, Uvāttēku; (M) = Punna, Vālappunnu, Cālitā; (K) = Kanigala, Bettakanigala, Neyitāku. 2 (Tl) = Cirutēku, Kallatēku; (Ta) = Colikkay, Karrēkku; (K) = Bettada kanigala. 3 (U)=Rāi; (Tl) = Pārudu, Pārutākulu, Ravadana, Cinnakalinga; (Ta) = Kallicilaikkāy, Nāyttēku, Pinnai; (M) = Punna, Kotappunna, Pattippunna; (K) = Kānigala, Kādukanigala, Kōlatēgu. 233 (Tl) = Kāralli, Kāravalli; (Ta) = Andimiriyan, Valluttal; (M) = Valakkanna, Vankana; (K)=Andimargal, Andimuriyasa, Andipunaru.

Under 1 *foot diameter of the same category*—(none).

Exhibits.—1 (s. panel, l. block). 3 (s. panel, l. block).

(17) BEECH DAMMERS—

	V.	P.	S.	D.	U.	A.	VC.	Localities.
49. Dipterocarpus indicus.	46	695	1	3	1	3	III	WGTS., KAN.-TRV.
50. Dipterocarpus Bourdilloni.	42	512	1	3	1	4	III	WGTS., KAN.-TRV., scat.
59. Vateria indica ...	37	415	2	3	1	2	III	WGTS., KAN.-TRV., abdt.

Uses.—49 Reepers (Gbl. Bdn.). 50 Dug-out canoes (Bdn.); "Dipterocarpus: (The wood of all species is practically identical as far as structure goes; in weight, hardness and colour the differences between various

species seem to be no greater than those found within individuals of the same species growing in different regions; texture rather coarse and rough, does not crack badly but is liable to warp if not seasoned carefully, harder to saw than less resinous woods of the same family but not otherwise difficult to work, not commonly attacked by beetles but sometimes by dry-rot), posts above stumps, beams, joists, rafters, flooring, bridge and wharf construction (except piles), wagon-beds, ship-planking, barges and lighters, ties (i.e., sleepers), paving-blocks and mine-timbers (impregnated), cheap and medium grade furniture, one of the most generally used construction woods of the islands," (Schneider). 59 (not much in request, not strong whilst the grain is coarse and rough, occasionally used for) canoes, coffins, masts of native vessels, shelves, rough doors and so forth (Gbl. Bdn.), "Mendis says that it is a first class timber for tea-chests (too heavy Bdn.)", packing-cases, ceilings, coffins, etc. (Gbl.); used in Calicut very largely for cordite boxes, and found to be a good timber, and likely to be suitable in much the same way as Schneider indicates for Dipterocarpus (A.W.L.).

European timbers quoted.—They have the conspicous silver-grain that brings them into line with Beech (F.W. 31) and to some extent (of greater durability) its qualities, but it resembles much more nearly the Red Deal (F.W. 18, Scotch Fir) of a better, though perhaps not quite the best quality, the resin, the colouring, the transverse strength (even 59 is 415 whilst R, Deal is (268—425), and durability all indicate this.

Vernaculars.—49. (Ta) = Enney, Vellayini ; (M) = Kalpayan, Kakka, Nili, Vellayini, Varanku; (K) = Banasampa, Callenne, Enne, Ganduyenne, Maradenne, D'huma, Valivara. 50 (M) = Karannili, Carattannili, Palappayan; (K)=D'huma. 59 (Ta) = Kundurukkam

Vellaikkundurukkam, Kungiliyam, Vellaikkungiliyam, Tūbam; (M) Payan, Perumpayan, Vellappayan, Telli, Kunturukkam.

Under 1 *foot diameter of the same category*—(none).

Exhibits.—49 (s. panel, l. block). 59 (l. and s. panel, l. and s. block).

(18) BEECH FEATHERFOILS—

	W.	P.	S.	D.	U	A.	VC.	Localities.
418. Bridelia retusa...	54	655	4	3	2	2	III	Most districts.
419. Phylanthus emblica (H).	50	645	4	3	2	1	III	All districts abdt : dtts.
420. Glochidion Hohenackeri.								WGTS., KAN., TRV.
421. Glochidion arboreum.								NLGS., TRV., TVY.
422. Glochidion neilgherrense. (420–423 bracketed together)	53	...	5	3	3	3	IV	NLGS.
423. Glochidion Heyneanum.								NCCS.
429. Bischofia javanica.	44	681	1	3	1	3	II	Most districts ntts. or rvrs.

Uses.—418 (yellowish grey to olive-brown, durable, stands well under water and under ground, not easy to work), house building, sleepers, construction of carts and agricultural implements (Bed. Bs. and Gbl.). 419 (red to dark red, durable especially under water, warps and splits in seasoning, takes a fine polish); building purposes, good poles, furniture, well-curbs, turning, gun-stocks, agricultural implements (Bed. Bs. Gbl. Kurz.) 420, 421, 422 and 423 (practically identical), red, often bright red (cabinetwork and turning (Gbl.). 429 (light red to dark claret red, durable and almost imperishable in muddy ground or under water but above ground liable to be attacked by white-ants, seasons well but liable to warp and crack, takes a fine polish—Bed. Bs. Gb. Kurz.; texture coarse rough dull with a decided odour of vinegar when fresh, checks and warps badly if not seasoned carefully, durability excellent underground otherwise III—Schneider), bridges and other works of

construction, building especially planking, specially suited for piles and sleepers, furniture (Bed. Bs. Gbl. Kurz.); posts above stumps, beams, joists, rafters, flooring, foundation piling, and recommended for treated ties, mine-timbers and paving blocks (Schneider).

European timbers quoted.—From their quality of durability under water and their prominent silver-grain they have analogy with the Beech (F.W. 31) and their durability underground with their transverse strength adapting them for construction gives them a resemblance to the Elm (F.W. 46), but their transverse strength is considerably greater than either.

Vernaculars.—418 (U) = Kosi; (Tl) = Annemu, Bontavēgisa, Duriyamaddi, Errapattakā, Kōdāri, Koramaddi, Poramānu; (Ta) = Acavai, Adamarudu, Ciruvēngai, Kōmanci, Mulvēngai; (M) = Calaru, Kōmanci, Mullukkayani, Mulluvēnna; (K) = Asana, Gōjji, Koyyamunji, Mullubēnga, Mulluhonne, Nasinage, Siruhonne. 419 (U) = Onolā; (Tl) = Usirika, Nelli, A'malakam; (Ta) = Nelli, A'malagam; (M) Nelli, A'malakam; (K) = Nelli, A'malaka, Cattu, Dādi. 420 (M) = Kulucān; (K) = Nirjani. 421 (names not known). 422 (Ta) = A'nikkāy; (K) = A'nikāyi, Banavara. 423 (Tl) = Endrika, Lajoda, Ragoda. 429 (U) = Dingiri; (Tl) = Nalupumushti, Panta; (Ta) = Madagirvēmbu, Milāccadayan, Tondi; (M) = Nīra, Tirippu, Nannal; (K) = Nigurulle, Goparinigurulle, Nīle.

Under 1 *foot diameter of the same category.*—729, 784, 788, 789, 790, 791, 802.

Exhibits.—418 (s. panel, l. block). 419 (s. panel). 422 (l. & s. panel), (l. block). 429 (s. panel, l. & s.block.)

(19) FALSE ALDERS—

	W.	P.	S.	D.	U.	A.	VC	Localities.
46. Ternstroemia japonica.	40	...	4	3	2	4	IV	WFTS., esp. NLGS.
270. Barringtonia acutangula.	39	609	4	3	2	2	III	Most dist., rvrs., fswp.

(19-*a*) HEATHS OR BRIAR-PIPE WOODS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
313. Rhododendron arboreum.	40	...	5	4	4	3	V	NLGS., TRV., Anms., Pnis.

Uses.—46 (requires to be well seasoned but works well, red-brown), building, rafters, doors, etc. (Bed. Gbl.). 270 (tough, strong, durable and warps but little if carefully seasoned, takes good polish, light brown or brownish-white to red-brown), cabinet-work and furniture, boat-building, well-work, carts and rice-pounders (Bed. Gbl. Kurz.). (19-*a*) 313 (shrinks and warps in seasoning, not durable except under cover), posts and gunstocks, (Bed. doubted by Gbl. and Bdn.), knife-handles, plates and dishes (Gbl. Bs.). Mathieu says that the wood is identical with that of Rrica, from the roots of which briar-pipes are made, wherefore the roots of this would probably answer the same purpose (A.W.L.).

European timbers quoted.—These False Alders have practically the same weight, colouring, and a pronounced silver-grain, as in the Alder (F.W. 19), and 270 at least does well under water. 46 is usually found near streams or in damp " sholas ", which often betokens that property, and it may be found that this species also has that quality.

Vernaculars.—46 (K) = Kemmuni. 270 (U) = Hinjolo, Nij'hira; (Tl) = Kadamu, Kanapakanigi; (Ta) = Cengadambu, Kadambu, Perungadappai, A'ram, Kanatti; (M) = Attampu, Ceriyasamstaravati, A'rruppēra, Nīrppēra ; (K) = Holekauva, Nīrganigalu, Nīrdaddal. (19-*a*) 313 (Ta) = Alingi; (M) = Kāttuppuvaracu; (K) = Bili. Pu.

Under 1 *foot diameter of the same category.*—Cat. 19.—(none); Cat. 19-*a*.—720, 721, 722.

Exhibits.—46 (l. and s. panel, l. block). 313 (l. and s. panel, l. and s. block, root).

(20) RED CEDAR MAHOGANIES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
108. Garuga pinnata.	40	..	4	3	2	2	III	Most dist. dts.
115. Melia composita (S).	26	391	3	3	2	3	III	GJM., KNL., MPLT., WGTS., scat.
116. Dysoxylum binectariferum.	43	290	3	3	2	3	II	KAN.-TVY., CBT., RA., scat.
133. Cedrela toona (S).	35	465	1	2	1	2	I	Agt., SAC.-MRA., CRG., TVY.
148. Lophopetalum Wightianum.	29	467	2	3	2	2	II	KAN.-TVY., NLGS., Anms., Pnis.
215. Acrocarpus fraxinifolius.	35	...	1	3	2	2	II	CRG., TVY., NLGS., Anms.

Uses.—108 (red-brown), durability doubtful, sapwood not durable attacked by insects, seasons well, polishes somewhat indifferently), not for construction but for indoor work, cabinet-work and furniture, (Bs. Gbl.). 115 (soft, pink, not attacked by white-ants), buildings, ceiling, boat-outriggers, furniture, boxes (Bed. Gbl. Bdn.). 116 red or red-grey, no defined uses, usually confused with White Cedar in the forest, "the wood is worthy of notice", Gbl.). 133 (soft red or red-brown, not strong, durable, not eaten by white-ants seasons readily and is easily worked, takes fine polish, Bed. Bs. Gbl.; seasons well except that thick planks are liable to internal checking unless carefully undertaken Schneider), buildings, furniture and cabinet, work, door-panels-carving, tea and cigar-boxes (Bed. Bs. Gbl. Kurz.), high-grade cigar-boxes, piano cases and all internal parts of pianos except the mechanism, dug-out canoes, seathing and ceiling, carving and sculpture, paddles and light oars, automobile mud-guards, wardrobes and clothes-chests, boats and small launches, ship's cabin finish (Schneider). 145 (light pink to red-grey), eaten by white-ants and bored by beetles, more durable if smoked Bdn. much esteemed in South Kanara, Bed. Gbl., building, rafters, planking, packing-cases (Bed. Gbl. Bdn.). 215 (pink to light red, fissile, shrinks in seasoning), building, furniture, shingles, tea-boxes (Bed. Gbl. Bdn.).

European timbers quoted.—Distinctly of the Mahogany (F.W. 42-bis.) type but softer and lighter, some of much paler colouring.

Vernaculars.—108 (Ux) = Hándulomoli, Mohī, Nibrymohī, Sompotri, Sorupotri ; (Tl) = Garuga, Garudu, Kondavēpa ; (Ta) = Arunelli, Enneykkārai, Karuvēmbu, Karavilangan, Vilangam, Malaiyudi ; (M) = Karavēmpu, Kariyan, Kāttukkalinjam ; (K) = Gadde, Biligadde, Nelligadde, Aranelli, Doddadumpli. 115 (U) = Mohālimbo, Potonolimbo ; (Tl) = Munnatikāraka ; (Ta) = Malaivēmbu, Turukkavēmbu ; (M) ; Malavēppu, Kattampālam, Conakil ; (K) = Bettbēvu, Bēvu, Hebbēvu, Kādubēvu, Turakabēvu 116. (Ta) = Aguniyagil, Cembil ; (M) = Agil ; (K) = Agilu, Kādugand'ha. 133 (U) = Mohālimbo ; (Tl) = Gāli, Nandi ; (Ta) = A'yil, Candanavēmbu, Cevvagil, Cūli, Madagirvēmbu, Māli, Tēvadāram, Tūnu, Vedivēmbu ; (M) Akil, Conakil, Arana, Devatāram, Vedivēmbu, Tunnam, Kac'ham ; (K) = Dēvadāri, Gand'hagarige, Garige, Kalingi, Kalkalingi, Kempugand'hagiri, Sūli, Belandi, Noge. 145 (Ta) = Venbalagai, Vengottai ; (M) = Kāruka, Vellappollam, Venkut'ham, Venkatavu ; (K) = Bōralopāle. 215 (Ta) = Kurangam, Malaikkòn, Malaikkonrai, Cegappuyagil ; (M) = Kurannan, Kurannáti, Malakkonna ; (K) = Belangi, Havalige, Kalingi, Kalkalingi.

Under 1 *foot diameter of the same category.*—590, 596, 662, 664.

Exhibits.—108 (s. panel, l. block). 115 (s. panel, s. block). 133 l. and s. panel, l. and s. block). 145 (l. and s. panel, l. and s. block). 215 (s. panel, l. block).

(21) CAMEL'S-FOOT MAHOGANIES—

	W.	P.	S	D.	U.	A.	VC.	Localities.
204. Humboldtia Brunonis.	...	...	4	4	3	3	IV	CRG.-MBR., NLGS.
205. Humboldtia Vahliana.	37	442	4	4	3	3	IV	MBR.-TVY., NLGS.
206. Humboldtia decurrens.	43	716	4	4	3	4	IV	TVY., TRV.

	W.	P.	S.	D.	U.	A.	VC.	Localities.
207. Bauhinia racemosa.	47	443	5	3	3	2	IV	Most dist. dtts.
208. Bauhinia malabarica.	47	563	4	3	3	2	III	Most dist.
209. Bauhinia retusa (H).	58	...	4	3	3	3	IV	NCCS.
210. Bauhinia purpurea.	46	...	5	3	3	3	IV	NCCS., MPLT., WFTS., scat.
211. Bauhinia variegata.	46	...	5	4	3	3	IV	NCCS., DKN., MPLT., WFTS. scat.

Uses.—204, 205, 206 (light brown with sometimes a small irregular dark centre, not used). 207 (brown with dark irregular patches near centre, elastic, polishes well, not used). 208 (reddish-brown with irregular purplish or black central patches, serviceable), house-posts, cross-pieces of harrows (Bed. Kurz.). 209 (hardest of the genus but not much used, Gbl.) 211 (not so durable as last), agricultural implements (Bs. Gbl.).

European timbers quoted.—Although comparatively poor in colour, in structure these are almost similar to the last, and therefore to Mahogany (F.W. 42 bis.), which they approach much nearer in weight; they are also somewhat small timbers, but could be employed for the minor uses of Mahogany.

Vernaculars.—204 (names not known). 205 (Ta)= A'rruvanci; (M) Kūrappunnu, Kurati. 206 (Ta)= Kuntāni; (M)=Nānōli, Malantotappu. 207 (U)= Omborodā; (Tl) = A're, Manciyāre, Paccāre, Adaviyāre; (Ta) = A'rai, A'rikka, A'tti, Cirrāccā, Callagi; (M) = Mandāram, Kotappuli; (K) = A'ra, A'ralumandāra, A'rise, Ayata, Kittārisa. 208 (U) = Gohonoborodā; (Tl) = A're, Pullāre, Pullagoddukūra, Pulladanda; (Ta) = Malaiyātti, Puliyātti, Vattātti; (M) = A'rāmpuli, Mīnpuli, Kokkavāli, Ponnan; (K) = Basavanapādu, Cappara, Kōgile, Mandāra. 209 (Tl) = A're, God-duyāre, Goddukūra. 210 (U) = Borodā, Debokānjoro, Koconāro, Sono; (Tl) = Bōdanta. Dēvakāncanamu, Kāncanamu, Peddāre; (Ta) = Cegappumandārai,

Mandārai, Kalavilaicci, Periyāvatti; (M) = Unvanamandāram; (K) = Kempukancivāla, Kempumandāra, Basavanapādu, Kancivāla. 211 (U) = Borodā, Koconāro, Kāncono; (Tl) = Bódanta, Dévakáncanamu, Káncanamu, Mandára ; (Ta) = Cegappumandárai, Mandárai, Cemmandarái, Vellaippúvátti; (M) = Kóvidáram, Unnu, Cuvannamandáram; (K) = Kancivála, Ayata, Mandára, Karálab'hógi, Kempukancivála, Bilikancivála, Kempumandára.

Under 1 *foot diameter of the same category.*—644, 645, 646.

Exhibits.—207 (s. panel, s. block). 210 (l. and s. panel). 211 (s. panel, l. block).

(22) ASH POONS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
40. Calophyllum inophyllum.	46	318	4	2	1	4	III	WTCT., litl.
41. Calophyllum tomentosum.	37	640	1	2	1	2	I	WGTS., CRG.-TVY., Anms., Pnis.
42. Calophyllum Wightianum.	42	573	3	2	1	3	II	WTCT.

Uses.—40 (Red-brown, seasons well, not hard to work except difficulty in surfacing, grain usually very curly and crossed, rarely attacked by insects, durability II,—Schneider), ship-building, masts and spars, railway sleepers, machinery, beautiful wood for cabinet-work, (Bed. Gbl. Kurz.); posts or stumps, doors, flooring, sheathing and ceiling, ships' knees and ribs, hubs, fine furniture and cabinet-work, musical instruments (heads and necks) (Schneider). 41 ("would be useful for any "purpose to which Mahogany is applicable, beside "having a greater degree of strength and stiffness "compared with its weight. Whereas the mean strength, "stiffness and toughness of Oak being represented by "100, and that of Riga Fir—whose lightness and stiffness "render it superior to any other material for beams, "girders, joists, framing in general, mats and other parts "of vessels—by 80, 114 and 56, and whereas compared

"with Riga Fir as 1,000 the relative strength, stiffness "and resilient power are, from the mean of Barlow and "Fincham's experiments as follows:—Strength 1303, "Stiffness 1250, Resilience 1273, it appears that, com-"pared with Oak its relative strength is 140, stiffness "142, and toughness 97, and that it is superior to Riga "Fir in the properties required for most wood."—Tredgold:), ship-building, bridge-building, constructions, shingles (Bed. Gbl. Bdn.); dug-out canoes in Malabar (A.W.L.). 42 valuable for engineering purposes, house-building and furniture (Bed. Gbl. Bdn.).

European timbers quoted.—Mahogany (F.W. 42-bis), Oak (F.W. 44), Riga Fir—the best quality of Scotch Fir (F.W. 18).

Vernaculars.—40 (Ta) = Punnai, Pinnai, Punnāgam; (M) = Punna, Ponnakam; (K) = Honne, Hūhome, Namēru, Surahonne. 41 (Ta) = Pinnai, Kāttuppinnai, Pungu; (M) = Punna, Kāttuppunna, Cōlappunna, Malappunna, Punnappai, Kumpu, Viri, Karunguttiyam; (K) = Srīhonne, Holehonne, Bobbe, Kūve. 42 (Ta) = Cerubinnai, Analveri; (M) = A'rruppunna, Ceruppunna, Mannappunna, Purappunna; (K) = Kalhonne, Kalponne, Kaiponne, Siriponne, Bobbi.

Under 1 *foot diameter of the same category.*—(None.)

Exhibits.—40 (l. panel). 41 (l. and s. panel, l. block). 42 (l. and s. panel, l. block).

(23) RED DEAL DAMMERS—

	V.	P.	S	D.	U.	A.	VC.	Localities.
107. Boswellia serrata.	39	.	4	4	3	2	IV	Most districts, dtts.
109. Balsamodendron caudatum.	33	...	4	4	3	2	IV	KSN.-SLM., CNTC., dtts
112. Canarium strictum.	37	523	2	4	3	3	III	CRG.-TVY., MRA., Anms., MYS.
317. Dichopsis elliptica.	42	472	1	4	2	3	III	CRG.-TVY., WFTS., MPLT.

Uses.—107 (Sapwood not durable, but heartwood durable) = masts (fide Roxburgh), furniture (Bs. Gbl.). 109 (cuts smoothly, not used, Gbl.). 112 (wood perishable

and little used, Gbl. Bdn. "the structure of all species of the genus is practically identical, grain straight, texture fine dense glossy, seasons well but subject to attacks of shot-hole borer, rather easy to work, durability IV"—Schneider), house-posts (last for fifteen years if charred), cheap construction, studding, joists, rafters, furniture, treated ties and paving blocks, box lumber (Schneider). 317 (not very strong Bdn., "the wood of all species, except for some differences in colour, weight and hardness of a minor degree, is practically identical, grain straight or slightly crossed, texture fine, smooth taking an almost glossy finish under sharp tools, seasons very well, very easy to work, durability IV; but rarely attacked by beetles"--Schneider), building, rafters, planking, shingles, furniture (Bed. Bdn.), boxes, packing-cases Malabar (A.W.L.), siding, sheathing, ceiling, floors, doors, interior finish, concrete forms, dugouts, lighters, boats, barges, boxes, furniture, general, cheap and temporary construction, cigar-boxes, bottoms and sides of drawers, shelves, backs of sideboards (Schneider).

European timbers quoted.—These represent a second-rate quality of Red Deal (F.W. 18—Scotch Fir) and are distinctly inferior to the Beech Dammers (Cat. 17), as will be seen from their transverse strength and value class; but they undoubtedly answer the purposes of the second grade deals.

Vernaculars.—107 (U) = Lōbān; (Tl) = Anduga, Guggilamu, Tellaguggilamu; (Ta) = Kungiliyam, Vellaikkungiliyam, Parangiccambarāni, Valugam; (M) = Kuruntukkam, Vellakkuruntukkam, Mukkundam, Pālankam; (K) = Dūpa, Guggula, Guggiladūpa. 109 (Tl) = Kondamāmidi, Kondarāgi, Mettamāmidi, Pullamāmidi; (Ta) = Kiluvai, Cengiluvai, Malangiluvai, Malaikkiluvai, Karppūrakkiluvai, Paccaikkiluvai; (K) = Bettamāvu, Kalmāvu, Kondamāvu, Hasuvāra. 112 (Ta) = Kundurukkam, Karundurukkam, Kungiliyam,

Karungungiliyam, Karuppukkungiliyam, Tūbam; (M) = Payan, Pantappayan, Pantam, Kungiliyam, Karuttukkungiliyam, Viraka; (K) = Hālemaddu, Karedūpa, Mandadūpa Pāndu, Rāladūpa. 317 (Ta) = Pālvadindān, Pālai, Pāccōrrippālai; (M) = Pāli, Cōlappāli, Cōmpāla, Pāccontippāla, Kaippāla; (K) = Pālucotte.

Under 1 *foot diameter of the same category.*—558.

Exhibits.—107 (l. panel). 109 (l. panel, s. block). 112 (l. block). 317 (s. panel, l. block).

(24) CINNAMONS

	W.	P.	S.	D.	U.	A.	VC.	Localities
398. Cinnamomum zeylanicum. 399. Cinnamomum sulphuratum. 400. Cinnamomum. Wightii. 401. Cinnamomum macrocarpum.	39	509	3	2	2	3	III	WFTS., esp. KAN., MBR., NLGS., TRV., Anms., Pnis., as Bed. suggests, may be considered one species.
402. Machilus macrantha	35	408	3	2	2	3	III	NCCS., MPLT., WGTS.

Uses.—398 to 401. (The wood is not used—(Gbl. Bdn.), wood with strong and lasting odour, warps badly unless very carefully seasoned, easy to work, durability where exposed unknown but otherwise at least II, never attacked by beetles but rapidly destroyed by termites—Schneider), beams, flooring, etc., in small houses, household implements, carved articles, excellent material for lining wardrobes, chests, etc. Schneider). 402 (weak and liable to be eaten by insects, would answer as a substitute for deal—Bed. Bdn.—seasons well, easy to work, takes a glossy cut under sharp tools, rarely attacked by insects, durability II—Schneider), common planking but inferior to Mango (Bdn.), carving, sculpture, door-panelling, wardrobe and carriage panelling, musical instruments, cabinet work, pyrography, (Schneider).

European timbers quoted.—Beddome has likened this class to Deal (White Deal, F.W. 10 and 11; Red Deal

and 2, 18), but it seems rather to approach the Cherry (F.W. 36), especially in colouring and uses, a bit softer and lighter in weight but much more durable.

Vernaculars.—398 to 401 (Ta.) = Karūvā, Kattukkaruvā, Ilavangam ; (M) = Karuppu, Kāttukkaruppu, Ilavanam ; (K) = Dālcini, Lavangam, Adividālcini, Adivilavangam. 402 (Ta) = A'naikkuru, Kollomāvu, Mulai ; (M) = Kulirmāvu, Urāvu, A'nakkuru ; (K) = Cittutantre, Gūlimavu, Krūrāmāvu, Nīrkukku.

Under 1 *foot diameter of the same category :*—(None.)

Exhibits.—398 (l. and s. block). 401 (l. and s. panel, l. and s. block). 402 (l. block).

(25) SUMAC MAHOGANIES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
169. Solenocarpus indica.	...	...	4	4	4	4	V	KAN.-TVY, Anms., scat.
170. Odina wodier ...	57	565	3	3	2	2	III	Most dist., common.
177. Nothopegia Colebrookiana (H.).	62	..	4	3	3	3	IV	NCCS., MPLT., WGTS., scat.

Uses.—169 (little known and not used—Bed. Gbl. Bdn.). 170 (sapwood copious, perishable, attacked by insects—blues very rapidly, A.W.L.—heartwood light red to red-brown, durable, difficult to season, works easily, planes smoothly and polishes well—Bed. Bs. Gbl. Kurz.), cabinetwork (very good), furniture, wheel-spokes, oil-presses and rice pounders, cattle-yokes, spear-shafts, scabbards (Bed. Bs. Gbl. Kurz.). 177 (strong but scattered) in many forests and comparatively small, so not used.

European timbers quoted.—These have very much the colouring and structure of the two Mastics (F.W. 49), but are heavier, and they have also a resemblance to Mahogany (F.W. 42-bis) ; they are eminently suitable, like the Mastics, for cabinet-work.

Under 1 *foot diameter of the same category :*—597, 611 and 778.

Vernaculars.—169 (names not known). 170 (U) = Mohī, Gongoromohī; (Tl) = Gumpena; (Ta) = Odi, A'naikkārai; (M) = Kariyan, A'nakkariyan; (K) = Udi. 177 (Tl) = Nallalli; (M) = Macaru.

Exhibits.—170 (s. panel, l. block).

B.—Yellow to Yellowish-brown.

(26) JACKS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
468. Artocarpus hirsuta.	36	644	1	2	1	2	I	WFTS., KAN.-TVY, SLM.-MRA.
469. Artocarpus integrifolia.	40	713	3	2	1	3	II	KAN.-TVY., NLGS., Anms.
470. Artocarpus Lakoocha.	40	577	2	2	1	3	II	CRG.-TRV.

Uses.—468 (wood yellowish-brown, durable, is not eaten by white-ants, does not warp nor crack, easily worked, stands contact with water well—Gbl. Bdn.), ship-building, planks, oars, boats, house-building, flooring and panelling, furniture (Bed. Gbl. Bdn.). 469 (wood bright yellow darkening on exposure, satiny, durable but not standing great alternations of dry and wet, inclined to warp if not properly seasoned, works well, takes fine polish—Bed. Gbl. Edn.), building, boat-building, carpentry, cabinet-work and furniture, marquetry, turning, brush-backs (Bed. Bs. Gbl. Bdn. Kurz.). 470 (wood yellow turning dark brown, durable, resists white-ants and teredo, difficult to saw but easy to plane and otherwise work—Bs. Gbl. Kurz.), house-posts, beams, rafters, piles in salt water, canoes, furniture, sugar-mills (Bed. Bs. Gbl. Bdn. Kurz.).

European timbers quoted.—These timbers are very near the White Mulberry (F.W. 33), slightly lighter in weight and not quite so hard, nor is the colouring quite so fine, but the structure is very similar; on the other hand these are more valuable in being large sized structural timbers.

Vernaculars.—468 (Ta) = A'yini, A'ncali, Kāttuppalā; (M) = A'nnili, A'yini, A'yinippilāvu; (K) = Hebhalasu. 469 (Ta) = Piā, Palācu; (M) = Pilāvu, Cakka; (K) = Halasu, Panasa. 470 (Ta) = Ilagucam, Cōlaippakku, Irappalā; (M) = Pulincakka; (K) = O'tehuli; Vātehuli.

Under 1 *foot diameter of the same category*:—(Cat. 26)—(none); (subcat. 26-a)—563, 792.

Exhibits.—468 (l. and s. panel, l. block). 469 (l. and s. panel, l. and s. block). 470 (l. and s. panel, l. block).

(27) TEAKS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
368. Cordia McLeodii fulvosa (H.).	52	...	4	2	2	3	III	Most dist. scat.
381. Tectona grandis.	45	661	1	1	1	2	I	GDV. southwards, WGTS. abdt.
382. Premna tomentosa.	60	..	4	2	2	3	III	Most dist. scat., com.
384. Vitex altissima alata (H.).	55	713	1	1	1	3	I	Do.
385. Vitex pubescens (H.)	54	...	4	1	1	3	III	Most dist. scat., NCCS. com.

Uses.—368 (fulvosa, more common in the southern districts, appears to be a less hairy form of McLeodii; wood light-brown with darker mottling in 1882–83, was sent from Cuddapah by dealers to Madras as Teak—A.W.L.—, tough, elastic, seasons well and works easily—Bs. Gbl.)—furniture, picture frames and other ornamental work, excellent fishing-rods, agricultural tools (Bs. Gbl.). 381 (wood golden-yellow turning dark-brown to almost black with age, very durable when seasoned preferably by girdling, does not split, crack, warp, shrink or change its shape, but splinters and as slats splits too easily, works easily and takes a fine polish—Bed. B.S. Gbl. (compared with Oak as 100 in each quality, strength 107, stiffness 126, toughness 94—Tredgold), major construction of all kinds and bridge, house and ship-building, decks of ships, backing of ironclads, railway-carriages and sleepers, cabinet-work, furniture, sculpture

and carving, beams, rafters, joists, flooring and ceiling, panelling, doors and windows, shingles, carriage and cart building, framing spokes and felloes (and is, in fact, used, where possible, for every conceivable kind of work) (Bs. Bed. Gbl.). 382 (wood light-brown, strong, takes good polish, and not nearly enough used-- Bed. Bs. Gbl. Kurz.), admirably suited for cabinet-work, turning, carving and fancy-work, weavers' shuttles (Bed. Bs. Gbl. Kurz.). 384 (wood yellowish tinged with olive-brown, durable, flexible, does not warp or crack, especially good under water (Bed. Gbl.), grain generally very straight, texture extremely dense and fine, taking a glossy surface under sharp tools, seasons well except splitting at the ends, in no way difficult to work except for hardness, durability I (Schneider), building, construction of carts and other purposes (Bed. Gbl.); piles, posts, ties, paving-blocks and ship, wharf and bridge building, foundation-sills, window-sills, windows, flooring, stairs, treads, risers, balusters, handrails, siding, sheathing, all kinds of interior finish, all kinds of structural parts, furniture and cabinet-work, wooden type and wood-cut, engraving, tool-handles, plane-stocks and other wooden tool parts, pestles, mortars and other household implements, framing of hemp-presses, sugar-mills, etc., cogwheels and inserted cogs, agricultural implements, yokes (Schneider). 385 (wood yellow to olive-brown and even to nearly red-brown, durable, appears to be excellent (Bed. Gbl. Bdn.), practically identical with the last (Schneider), wooden bells and various purposes (Bed. Gbl. Bdn.), same uses as the last, 384 (Schneider).

European timbers quoted.—Teak, sometimes called the "Oak of the East" is truly comparable to the Oak (F.W. 44) in colour, weight, transverse strength, dimensions, and versatility of utilization, whilst the Peacock Teak (384 and 385) has rather greater transverse strength

but is also heavier; from the difference in record of uses of the latter timber as given by Indian authorities and as given by Schneider, it shows how little its good qualities have been recognized out here.

Vernaculars.—368 (U) = Bohurolo, B'hoto; (Tl) = Botuku, Peddābotuku, Peddabattāva; (Ta) = Palandēkku, Perunaruvili; (K) = Bilicalle, Calle, Doddacalle, Hiricalle, Hīnacalle, Gāvudi, Mod'hasi. 381 (Tl) = Tēku; (Ta) = Tēkku; (M) = Tēkku; (K) = Tēga. 382 (U) = Sumonthi, Kotusumont'hi; (Tl) = Kampugummudu, Naguru, Namuru, Nāruva; (Ta) = Kollikkattaitēkku, Pīnāri, Podaganāri; (M) = Kāttuttēkka, Kollikkāttuttēkka; (K) = I'cu, Madike, Nārēle, Pīte, Tavadike. 384 (U) = Codāigodi, Tiloko; (Tl) = Nemaliyadugu, Mayūramu; (Ta) = Mayilai, Māyiladi, Kāttumāyilai, Kāttunocci; (M) = Māyila, Māyilila, Māyilati, Kāttumāyila; (K) = Naviladi, Māyūrōlu, Doddalakki, Kādunekki, Sompukēpala. 385 (U) = Codāigodi, Moyūriā, D'holāsik'hā; (Tl) = Nemaliyadugu, Busi, Rātangi; (Ta) = Māyiladi; (M) = Māyila, Māyilila, A'rrumāyila, Kāttumāyilila; (K) = Naviladi, Pordele.

Under 1 *foot in diameter of the same category*:—766 and 775.

Exhibits.—381 (l. and s. panel, l. and s. block). 382 (l. panel, l. and s. block). 384 (s. panel, l. block). 385 (l. and s. panel, l. block).

(28) White Teaks—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
4. Michelia champaca (S.).	36	576	2	1	1	4	II	NCCS. (agt.), WFTSG., scat.
5. Michelia nilagirica.	38	...	3	1	1	3	II	WFTS., esp. NLGS., Pnis., MPLT.
380. Callicarpa arborea (H.).	33	...	4	2	2	3	III	NCCS., esp. GJM., VZM., (agt.).
383. Gmelina arborea (S.).	36	459	3	1	1	2	II	Most districts.

Uses.—4 (wood yellowish-white to olive-brown, very durable, stored for 42 years in Calcutta and found

perfectly sound at the end, lasts well under ground, does not crack nor warp, polishes beautifully—Bs. Gbl. Kurz.), house-building (Coorg palace built almost entirely of it), house-posts, especially planking and door-panels, carriage-building, furniture, carving, sacred-beads and necklaces, drums (Bs. Gbl.). 5 (wood yellowish-white to olive-brown glossy, strong and very durable and lasts well under ground—Bed. Gbl.), house-building, beam and rafters, railway-sleepers (Bed. Gbl.). 380 (wood very like 383, light brownish-white, does not crack, takes beautiful polish—Bs. Gbl. Kurz.); cabinet-work, small furniture, carving (but not much used--Bs. Gbl. Kurz.). 363 (wood yellowish-white, sometimes with grey or pink tinge glossy, very durable, not attacked by insects, lasts well under water—and alternately submerged—and also in tidal streams, much better than Teak, seasons well without warping, cracking or shrinking, does not split nor splinter as does Teak, easily worked, takes paint and varnish or lacquer readily—Bed. Bs. Gbl. Kurz. Bdn.), house-building, especially posts, planking, door-panels, panelling, blinds and venetians, boat-building especially decking, well-work, sluice-gates even in brackish water, cabinet-work and furniture (show-cases in Calcutta Museum made of it), carriage-building and palanquins, organ-pipes and sounding-boards for musical instruments and drums, sculpture, carving, fancy-work and picture-frames, bullock-yokes, packing-cases and tea-boxes, wooden shoes (Bed. Bs. Gbl. Kurz.).

European timbers quoted.—This category seems to partake of the qualities of Teak, combined with those of Elm (F.W. 46) or Alder (F.W. 19); its structural capabilities combined with its use underground approximate it to Elm its prominent silver-grain and durability under water give it some resemblance to Alder, though far superior.

Vernaculars.—4 (U) = Compā, Compoko; (Tl) = Campakamu, Cāmpēyamu; (Ta) = Canbagam; (M) = Campakam; (K) Campaka, Sampige. 5 (Ta) = Cambagam, Kāttuccanbagam; Nīlagiriccanbagam. (K) = Sampige, Bilisampige Doddasāmpige. 380 (U) = Bornnopotrī, Subornniborodo, Sānogomb'hāri, D'hāugomb'hāri. 383 (U) = G'hombāri, B'hodropornni, Kāsmorī; (Tl) = Gummudu, Peddagummudu, Callagummudu, Gumudutēku; (Ta) = Kumil, Perungumil, Umittēkku; (M) = Kumil; (K) = Kumule, Kūle, Kumbudi, Baccānige, Srīparu.

Under 1 *foot diameter of the same category*:—765 and 767.

Exhibits.—4 (l. planel, s. block). 5 (l. and s. panel, l. block). 383 (l. and s. panel, l. block).

(29). Beech Eans—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
186. Dalbergia lanceolaria.	44	718	4	4	3	3	IV	Most dist. not atts. scat.
190. Pongamia glabra.	44	686	4	4	3	2	IV	All dist. rvrs.
191. Ormosia travancorica.	41	...	3	4	3	3	IV	WGTS., KAN.-TVY.

Uses.—186 (wood yellowish-white turning pale yellow, strong, compact—Kurz. under D. paniculata), building (Bed. Gbl. Kurz.). 190 (wood yellowish-white turning yellow, not durable, attacked by insects but better if water-seasoned (Bed. Gbl.), temporary buildings, oil-mills, solid car-wheels (Bed. Gbl.). 191 (wood white or yellowish-white darkening on exposure, attacked by insects when young, little known or used (Bed. Bdn.). (*Note.*—Think Kurz.' description of D. paniculata, with non-nigrescent leaves, of the bark and of the wood all point to its being D. lanceolaria and not D. paniculata; see also Gamble's remark about Kurz. not D. lanceolaria—A.W.L.) (see Cat. 31.)

European timbers quoted.—The recorded descriptions do not help us much; but from personal acquaintance

with these timbers, I should say that they possess to a certain extent the qualities of Beech (F.W. 31); rather lighter in both colour and weight, devoid of the silver-grain, with rather greater transverse strength, they are tough, and perishable except under water, or when seasoned in water and used for industrial purposes not for constructions proper,—as is the Beech.

Vernaculars.—186 (U) = Dodilo; (Tl) = Paccāri, Errapaccāri, Kondapaccāri, Peddapaccāri, Pōtupaccāri, Peddasōpara, Vellāri; (Ta) = Kalvellangu, Nalvellangu, Kāttuppaccalai Erigai; (M) = Mannavitti Pulari, Punnu; (K) = Belaga, Hasarugōni, Bettahasarugōni, Manjalabite. 190 (U) = Koronjo; (Tl) = Kanuga, Kāgu; (Ta) = Pungu, Nirppungu; (M) = Mināri, Punnu, Unnu; (K) = Honge, Batti, Huligili, Karanja, Pungu, Kurundi. 191 (Ta) = Kunri, Malaimancādi; (M) = Kunni, Malamannāti.

Under 1 *foot diameter of the same category*:—635, 636, 637 and 676.

Exhibits.—190 (s. panel, l. block). 191 (s. panel, l. block).

(30) Yellow Laurels—

	W.	P.	S.	D.	U.	A.	VC.	Loclaities.
392. Cryptocarya Wightii. 393. Do. Stocksii.	44	666	4	2	2	4	III	WGTS., KAN.-TVY., scat. WFTS.,esp.NLGS., Anms., scat.
394. Apollanias Arnottii.	...	...	4	2	2	4	III	WGTS., MBR.-TVY., scat.
404. Phoebe paniculata ...	48	...	3	2	2	4	III	MPLT., NLGS., Anms., scat.
410. Litsaea tomentosa. 411. Do. sebifera ...	54	...	4	2	2	3	III	NCCS., MPLT., WGTS., scat.
414. Do. glabrata ... Stocksii ...	32	...	4	2	2	4	III	MRA., TVY., TRV., scat. NLGS., KAN., scat.
416. Do. zeylanica ...	...	...	4	2	2	2	III	NCCS. (Agt.)., WETS.

Uses.—(Very little is recorded about these, with the exception of an occasional reference "a good wood" or "seasons well, durable, not attacked by insects"; all of these, from their colouring, structure and other qualities, appear to be analogous to the various species of different genera of this family that Schneider classes under the "Yellow Baticulin type" of the Philippines, of which he records:—Wood soft to moderately hard, sapwood pale yellow generally turning a pale yellowish or greenish brown in seasoning and not very sharply defined from the heartwood, which is bright golden yellow when fresh, darkening somewhat with exposure, faint odour reminding one of both cedar and camphor, grain straight, texture fine with smooth waxy feel, taking a glossy cut under sharp tools, seasons well, very easy to work, durability II, even sapwood rarely attacked by insects), carving and sculpture, panelling for doors, altars, wardrobes, carriages, ceiling and sheathing, musical instruments, cabinet-work, pyrography (Schneider). 411, 416, building (Bed. Gbl. Bdn.).

European timbers quoted.—There is no true European representative of this category; perhaps the nearest approach is the Cedar (F.W. 22), with which they agree more or less in colouring, weight, and absence of silver-grain, but the transverse strength of these is nearly twice as great as that of Cedar, and whilst Cedar is poreless these have medium-sized pores; both are aromatic and of great durability.

Vernaculars.—392 (Ta) = Pālai; (M) = Katamāmpāri; (K) = Gulimāvu. 393 (names not known). 394 (M) = Centanam. 404 (Ta) = Cudalam; (K) Kūramāvu, Kumāri. 410, 411 (U) = Jādāmo; (Tl)=Naramāmidi, Nāra, Meda, Kanujunālike, Naranālike, Katuvukamma; (Ta) = Ama, E'lāmbiragi, Pippinbattai. 414 (M) = Unkakkanni, Karuvāttu. 416 (U) = Pohorāpotri; (Tl) = A'kupatrikamu, Bododo, Buroyida; (Ta) =

Cenbagappālāi, Cirubancatti, Malligaiccanbagappālai, Pancatti; (M) = Varanam; (K) = Beluri.

Under 1 *foot diameter of the same category*:—768-bis and 779.

Exhibits.—411 (l. and s. panel, l. and s. block). 416 (l. and s. panel, l. and s. block).

(31). BAST-RINGED MAPLES—

	W.	P.	S	D.	U.	A.	VC.	Localities.
187. Dalbergia paniculata.	43	...	4	5	4	1	IV	All dist. open forests.
386. Avicennia officinalis.	52	...	5	4	4	2	IV	GDV.-TVY., WTCT., litl., sswp.

Uses.—(It is impossible to use these timbers for ordinary purposes, owing to the "concentric masses of wood alternating with narrow soft layers of a fibrous substance, so that planks cut out of old trees often fall to pieces," (Bs.); in connection with 386, however, Schneider says:—"a wood that for its peculiar colour and attractive grain should find a good place in small cabinet-work," and this applies also to 187, and is even more noticeable in the case of many climbers--see list below).

European timbers quoted.—There are no European timbers with this structure; they perhaps call to mind, more than anything else, the irregular growth of "figured Maple" (F.W. 55).

Vernaculars.—187 (U) = D'hōbi, Purād'hōbi; (Tl) = Paccāre, Pacaru, Tellapacaru, Poralapaccāre, Sōpara, Poralasōpara; (Ta) = Paccalai, Vellangam, Nāyvellangu; (M) = Paiyangāni, Vattantōli; (K) = Paccāri, Hasarugōni, Belangu. 386 (Tl) = Mada; (Ta) = Uppukkurri, Uppattam; (M) = U'ri, U'rppam; (K) = Uppati.

Under 1 *foot diameter of the same category*:—492, 493, 496, 497, 498, 587, 625, 632, 638, 640, 652, 653, 654, 655, 755, 761, 762 and 814.

Exhibits.—187 (l. block). 386 (s. block). 814 (two slats).

C.—White or lightly Yellow-tinted.

(32) Ash Mast-wood—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
7. Polyalthia coffeoides / 8. Do. fragrans	40	567	3	3	2	3	III	MYS., MBR., TRV., Anms. / MYS., WGTS., Anms.
9. Do. cerasoides.	50	...	4	3	2	2	III	Most dist. dtts.
10. Popowia Beddomeana.		...	4	3	2	3	III	TVY., TRV.
11. Mitrephora Heyneana (H).	60	1169	4	3	2	3	III	TRV., TVY., Pnis.
12. Mitrephora grandiflora.		...	3	3	2	4	III	KAN.
13. Xylopia parvifolia ..	43	725	4	3	2	3	III	WGTS., KAN.-TRV.
14. Miliusa velutina ...	48	840	4	3	2	3	III	Most dist., mtts., scat.
15. Saccopetalum tomentosum.	41	...	4	3	2	4	III	Most dist., mtts., scat.
16. Alphonsea lutea ...	...	..	4	3	2	4	IV	NCCS., GTR., rvrs., scat.
17. Do. zeylanica.	...	...	4	3	2	4	IV	TVY., TRV., scat.
18. Alphonsea madraspatana.		...	4	3	2	4	IV	MYS., CDP., NAC., scat.
19. Oraphea erythrocarpa.	..	...	4	3	2	4	IV	WGTS., ANMS., scat.
20. Sageraea laurina / 21. Do. Dalzellii. (H)	48	788	4	3	2	4	IV	KAN., MYS., scat. MBR: TRV., Anms: scat.
424. Putranjiva Roxburghii.	49	...	4	3	3	2	III	Most dist. esp. ravs.
443. Celtis tetrandra ...	39	800	3	3	2	2	III	Most dist. above 2,000 ft.

Uses.—7 to 21 (the wood of all species is very similar, white or more frequently pale yellowish-white, with often a prominent silver-grain somewhat resembling "bird's-eye Maple" (F.W. 55), strong, elastic and durable, tough, somewhat liable to warp in seasoning, easily worked—Bs. Gbl. Bed. Bdn.,—"grain straight, texture rather fine, staining easily in drying, not very durable in contact with the ground or exposed to the weather, but otherwise durable and not commonly attacked by insects"—Schneider), house-building, small beams and rafters, carpentry, boat-building, masts and spars, carriage-shafts, cart-poles and yokes, barrels, agricultural

implements, harrows, spear-shafts, shoulder-poles, walking-sticks, drums (Bed. Bs. Gbl. Bdn.). 443 (Similar to, if not identical with, the Nettle Tree of Europe, Celtis australis—F.W. 52—Gbl.), Canoes, planking (Bed. Bs. Gbl.—see Mathieu and Schlich in F.W. 53). 424 (elastic, durable, easily worked—Bed. Bs. Gbl.), turning, handles of tools (Bed. Bs. Gbl.).

European timbers quoted.—It will be noticed that in describing the Nettle tree (F.W. 53) it was stated that its qualities resembled, but were considerably superior to, those of the Ash (F.W. 52), and, were it only more abundant, it would undoubtedly supplant the Ash in use; the latter is typically the European wood employed in all cases demanding elasticity and toughness; the Nettle is superior, and the whole of this category is on a par with, or superior to, the Nettle, whilst the silver-grain of many also tends to give them the characteristics of "bird's-eye Maple" (F.W. 55).

Vernaculars.—11, 12, 17, 18, 19 (no names known). 7, 8 (Ta) = Nedunārai, Acuvattai, Pūladai; (M) = Netunār, Villal, Kākkannāral, Pulluri, Cēla, Kōdānci; (K) = Gauri. 9 (U) = Nobinisworo; (Tl) = Ciluka-dudduga, Cittidudduga, Dudduga, Gutti; (Ta) = Kōdigilai, Nagutalilai, Nettanāratti, Nūlilai; (K) = Habbe, Sannaheccāra. 13 (Ta) = Karboruttal; (M) = Kalluppottan, Sāntu; (K) = Ulli. 14 (U) = Gontip'holāto; (Tl) = Nalladudduga, Peddacilukadud-duga; (M) = Kānakkaita, Villuni; (K) = Ance. 15 (U) = Gontip'holāto, Pātomosuno; (Tl) = Buddadudduga, Buddacilukadudduga, Gādidelotta; (Ta) = Periyuvāy; (K) = Heccāra, Kaladri. 16 (Tl) = Cirududduga, Mogili, Muvvi. 20, 21 (Ta) = Nedunāttu; (M) = Kānakkaita; (K) = Sāgare. 424 (U) = B'holokōli, Pohuncomā; (Tl) = Putrajīvika, Kudurujivi, Mahāputrajīvi; (Ta) = Karup-pilai, Pongōlam, Vicāranai; (M) = Ponkōlam; (K) = Putrajīva, Menasinakāle. 443 (U) = Korāyi; (Tl) =

Jabjābal. (Ta) = A'da, Kōna, Tavudi. (M) = Karukka; (K) = Aduva, Garuke.

Under 1 *foot diameter of the same category*:—474, 475, 476, 477, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490 and 519.

Exhibits.—9 (l. panel). 443 (l. panel, l. block).

(33) FALSE SYCAMORES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
99. Evodia Roxburghiana.	42	..	4	3	3	3	IV	WGTS., esp. NLGS., Pnis.
100. Zanthoxylum Rhetsa.	40	...	3	3	3	3	III	NCCS., WTS., KAN.-TVY., Anms.
355. Linociera intermedia leprocarpa.	..	...	4	3	3	3	IV	Most dist. scat. TVY., TRV.
369. Ehretia laevis.	...	...	...	...	...	...	...	Most dist.
370. Ehretia ovalifolia.	34	...	5	3	3	2	IV	CBT., MRA., TVY.
372. Dolichandrone crispa.	44	...	4	3	3	2	III	DKN., MPLT., CNTC., com.
373. Dolichandrone falcata.	..	...	...	..	...	..	...	Most dist. bctn.
374. Dolichandrone Lawii.	46	...	5	3	3	2	IV	DKN.
375. Dolichandrone arcuata.	48	...	5	3	3	4	IV	NLGS., CBT., MBR., (Pgt), scat.

Uses.—(All said to be strong and serviceable without other information except 369, 370, which are also said to be durable, tough and easily worked—Bed. Bs. Gbl.). 359, 370, 372, 373, 374, buildings, agricultural implements —(Bed. Bs. Gbl.—for others no uses given). A cognate species to 100 is used in the West Indies for furniture and inlaying; whilst a softer species than 372 to 375 of the same genus is used in the Philippines for handles of kitchen utensils, household utensils, of cheap knives, and for wooden shoes.

European timbers quoted.—With the exception of the silver-grain not being so conspicuous, these seem to resemble the Sycamore (F.W. 56), in colour, weight and structure,

Vernaculars.—99 (M) = Kanila, Kāttuccempakam; (K) = Tambita. 100 (Tl) = Raccamānu, Morapu; (Ta) = Iraccai. (M) = Karimurikku, Mullilam; (K) = Aremādulu, Aremāpala, Jimmi, Sesele Kāvati. 355 (U) = Esumuko; (Tl) = Satapála, Verripogada, Cēdanērēdu, Kurumā, Udadam; (Ta) = Kalidalai; (U) = Kunda. 369, 370 (U) = Gucāipo, Mosryniā; (Tl) = Bukkedi, Adabukkedi, Pótubukkedi, Būri, Peddabūrimēli, Peddapiccaka, Tellapisuni, Pāladantamu, Tellajihvi; (Ta) = Pattaiviracu, Kuruviracu; (M) = Cavanti; (K) = Adake, Karadake, Halliype, Kapura, Pagakina. 372 (Tl) = Oddi, Nīruvoddi, Vankaniroddi; (Ta) = Pārudi, Kombādiri, Pūmbādiri, Vattalappū; (K) = Udure, Beludure, Nirudure. 373, 374 (U) = Mrygosingo; (Tl) = Oddi, Cittvoddi, Cittiniruvoddi, A'rkuvoddi; (Ta) = Kadalātti, Kaliyāccā, Pacalātti, Udi, Kāttuvaruccam; (M) = Nirpponālyam; (K) = Udure, Mududavudure. 375 (Ta) = I'rappālai, Pēcalātti; (K) = Kādunirudure.

Under 1 *foot diameter of the same category.*—505, 506, 536, 553, 556, 594, 683, 694, 713, 714, 716, 757, 768, 771 and 799.

Exhibits.—99 (l. and s. panel, l. and s. block). 100 (l. and s. panel, l. and s. block). 372 (s. block).

(34) FALSE MAPLES—

	W.	P	S.	D.	U.	A.	VC.	Localities.
278. Casearia esculenta.	54	.	4	3	3	2	III	NEL., KNL., Rmdg. WCTS
279. Homalium nepalense.	53	...	4	3	3	3	IV	NCCS. (Agt.), Mhgi., Jprs., Rpas.

Uses.—278, 279 (strong and elastic, durable, apt to split in seasoning, does not warp, works smoothly, not used—Gbl.).

European timbers quoted.—These are white satiny or shining timbers very much of the quality of Maple (F.W. 55) and approximately the same weight, but without such a pronounced silver-grain; and might well be used for similar purposes. Attention is also drawn to the timbers of Cat. 32, for use for the same purpose.

Vernaculars.—278 (Tl) = Kondajunguru; (Ta) = Kākkaippilai, Kilar, Kottargōai, Kutti, Vencanduvar; (M)= Cerukkannan; Malanpāvatta, Pannimurangam, Vellakkannan; (K) = Doddahānice, Hillehānice. 279 (U) Kidā kuntu; (Tl) = Balbāli, Cēdu.

Under I *foot diameter of the same category*:—643, 731.

Exhibits—(None).

(35) WHITE EBONIES—

	W.	P.	S	D.	U.	A.	VC.	Localities.
327. Diospyros montana.	47	...	4	2	2	3	III	Most dist. scat.
328. Diospyros embryopteris.	4	...	4	2	2	3	III	NCCS. (rvrs)., WTCT. (sswp. r vrs).
330. Diospyros foliolosa (H.).	...	...	4	2	2	4	III	MRA., TVY., TRV.
331. Diospyros ovalifolia (H.).	...	...	5	2	2	3	III	CRG-TVY., NLGS., Anms.
334. Diospyros sylvatica.	50	...	4	2	2	2	III	NCCS., DKN., WGTS
336. Diospyros chloroxylon (Y.).	45	...	4	2	2	2	III	NCCS., COCT., DKN.
341. Diospyros nilagirica.	45	603	4	2	2	3	III	WGTS., KAN TRV., NLGS, esp.
342. Diospyros affinis (H.).	...	...	4	2	2	4	III	TVY., TRV.
345. Diospyros paniculata (S.).	46	446	4	2	2	3	III	

Uses.—(Wood practically without heartwood, mostly pale yellowish-white, 336 distinctly yellow, no details, and no uses except those noted, recorded—Bed. Bs. Gbl.—
"whether or not a given species produces black heart-
"wood depends largely on the size attained, but
"evidently also on other conditions, as there is a wide
"variation in the relative amounts of sapwood and heart-
"wood in individuals of the same species; grain
"generally very straight, texture fine smooth and espe-
"cially in the heartwood) very dense, very difficult to
"season well, logs almost invariably checking in several
"directions from the heart outwards, while sawn lumber
"must be stacked carefully and weighted to prevent
"warping, once thoroughly dried however it becomes
"very stable, difficult to work but takes a beautiful

" surface under sharp tools, durability of heartwood I, " of sapwood II, but even the latter practically never " attacked by beetles though not termite proof— " Schneider); 328, sometimes used for building (Bed.). " 327 good furniture wood (Bs.); 330 (much used in " Tinnevelly district, Bed.—recently sent to Madras "thence for) butcher-blocks (A.W.L.). small trees " containing little or no heartwood are used for posts, " beams, joists, rafters, window-sills, parts of agricul- " tural implements, etc.; also in lumbering small poles " are used for skids, on account of their hardness, tough- " ness and smooth-wearing qualities; Heartwood (or " sometimes sap and heart together) for scabbards, " canes, hilts, tool-handles, gunstocks, saw-frames, etc., "a favourite for musical instruments, especially finger- " boards and keys of guitars, furniture, cabinet-work, " in-laying, paper-weights, inkstands and similar desk- "supplies; sapwood, which is almost as hard as the " heartwood and very much tougher, is excellent material " for T-squares and other drawing instruments, for " shuttles, bobbins, spindles, golf-club heads and shafts, " ax, pick and hammer handles, etc." (Schneider). It has been deemed advisable in this to separate the White (35), Red (42), Striped (52), and Black (56). Ebonies, but under the uses in the categories a reference will be made here (A.W.L.).

European timbers quoted.—Though very different in colour and possessed of larger pores, these timbers rather resemble in weight and structure the Pear (F.W. 41).

Vernaculars.—327 (U) = Koshak'holi, B'hodrikā, Gourokoshāyo; (Tl) = Eddayagāta, Gātugāga; (K) = Eddayagāta, Catugaga, Muccitumiki, Kākavulimidi; Nallavulimidi Makuna, Pálbungi; (Ta) = Vakkanai, Velvakkanai, Vakkanāttan, Vellittuvarai; (M) = Bāli; (K) = Jagalagante, Balkuniki, Kādubālekāyi, Vankana,

328 (U) = Kāndu, D'husārokendu; (Tl) = Tummiki, E'titummiki, Nīrutummiki, Muttiyatummiki, E'losu, Gābu; (Ta) = Paniccai, Tumbi, Tuvarai, Kavikkattai, Kāttatti, Pattuppalam; (M) = Panicci, Vananci; (K) = Olletupare, Holetupare, Kākutupare, Tupare, Antina, Banda. 330 (Ta) = Vellaittuvarai, Pulivellaittuvarai. 331 (Tl) = Kukkatumiki; (Ta) = Vedikkanuru. 334 (U) = K'hālijya, Mod'hurok'hālijyā; (Tl) = Gāta, Gāda, Gādalúti, Nallagāta, Nallakākamushti, Verrigāta; (K) = Akkasarali Bilisarali, Kākasarali. 336 (U) = Koshāyo, Ondodi; (Tl) = Ulinda, Peddavulimidi, Tellavulimidi, Kayakimānu; (Ta) = Vakkanai, Karuvakkanai, Periyavulinci. 341 (Ta) = Karu. 342 (Ta) = Vankkanai. 345 (Ta) = Karunduvarai; (M) = Kari, Karivella, Ilakkatta, Vellabāla.

Under 1 *foot diameter of the same category.*—794 and 803.

Exhibits.—327 (l. panel, l. and s. block). 328 (s. panel, l. block). 330 (l. panel). 342 (l. block).

III.—Mostly Hard.

A.—Reddish.

(36) MAHOGANIES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
111. Bursera serrata.	42		3	3	2	3	III	NCCS., KNL.
114. Azadirachta indica.	49	614	4	2	1	2	II	Most dist. plains.
117. Dysoxylum purpureum.	52	708	2	2	2	4	III	MBR., TRV., scat
124. Amoora Rohituka.	41	...	4	2	2	3	III	WGTS., KAN-TVY., Anms.
125. Amoora canaranar.	..	...	4	2	2	3	III	WGTS., KAN-TVY,, Anms.
126. Amoora Lawii ...	...	...	4	2	2	4	III	WGTS., CRG-MBR , scat.
130. Carapa obovata.	44	526	4	2	2	4	III	COCT., WTCT , scat.
132. Chukrassia tabularis.	48	146	1	2	2	3	II	SAC-TVY , CRG.-TRV., MYS., scat.
201. Hardwickia pinnata (M).	46	640	1	3	2	3	II	WGTS., KAN.-TVY.
231. Pygeum Wightianum.	43	622	3	2	2	3	III	MBR-TVY. Anms Pnis. Svys. scat.
232. Pygeum Gardneri.	...	...	5	2	2	3	III	NLGS., MBR., TRV.

Uses.—111 (wood light brown turning red, close-grained fine fibred takes fine polish—Gbl. Kurz.), furniture (Gbl. Kurz.) 114 (wood red with grey sapwood, durable and not attacked by insects, resembles Mahogany, takes fine polish—Bed. Bs. Gbl. Kurz.), construction, ship-building, furniture (its use keeps off moths and other insects), carving and sculpture, cart-building (wheels), agricultural implements (Bed. Bs. Gbl. Kurz.). 117 (wood Reddish-brown faintly scented, excellent, no uses—Gbl. Bdn.). 124 (wood reddish-brown, it is good though little used, close-grained and takes a fine polish, Bs. Gbl. Kurz.), building, canoes (Bs. Gbl. Kurz.) 125, 126 (no information available ; " Amoora : some species are lighter and softer than the one described—grain straight, texture fine, seasons well, at least in small dimensions, difficult to work, durability II, even sapwood rarely attacked by beetles : uses : posts, beams, joists, rafters, flooring, doors, windows, interior trim, furniture and cabinet-work, bridge-wharf and other heavy construction timber ties, turned and shaped tool handles"—, Schneider) ; 130 (wood light red to deep wine red, strong but brittle and liable to warp, stands brackish water better than Sāl—Bed. Bs. Gbl. Kurz. " grain straight or slightly crossed, texture fine glossy, seasons very well, shrinking or checking or warping hardly at all, works easily, durability II, rarely if ever attacked by beetles "—Schneider), building furniture, spokes of wheels, handles of tools (Bed. Gbl. Kurz.), poles, ties, posts, beams, joists, rafters, doors, flooring, all interior finish high-grade furniture and cabinet-work (one of the most beautiful woods) (Schneider). 132 (wood light to dark red-brown satiny elegantly veined and with Cedar smell, very durable lasting for hundreds of years in the Palace of the Kandyan Kings, Bed. Gbl. Kurz.), building, cabinet-work and furniture (Bed. Gbl. Kurz.) = Trichinopoly cigar-boxes (A.W.L.). 201 (wood red or red-brown with large white sapwood,

no further details, Bed. Gbl. Bdn. "Malabar Mahogany," A·W.L.), building, especially planking, furniture (Bed. Gbl. Bdn.). 231, 232 (wood pink-red, prettily mottled and streaked with large pink-white sapwood, containing prussic acid, durable, Gbl. Bdn., not used.

European timbers quoted.—Several of these are so exactly like Mahogany (F.W. 42-bis). that it would be nearly impossible to distinguish them, and the others closely approximate it.

Vernaculars.—111 (U) = Mohi, Sorupotrimohī, Onderu; (Tl) = Būsi, Karakabūsi, Errabūsi, Manutikaraka, Cittirekka. 114 (Tl) = Vēmu (Vēpa); (Ta) = Vēmbu, Vēppu; (M) = Vēppu; (K) = Bēvu, Bēmu, Ollebēvu. 117 (M) = Kārakil, Pūvalakil. 124 (Tl) = Rohitaka, Cēvamānu; (Ta) = Pēyccanbagam, Cem, Curailaccuvaram, Vangul; (M) = Cem; (K) = Mullumuttaga, Muk'hyamuttaga. 125 (Ta) = Cevvanai; (M) = Karakil; (K) = Tottile. 126 (Ta) = Erumaikkonrai; (K) = Madrasada. 130 (Tl) = Adivipucca; (Ta) = Conmundiri, Kandalangāy. 133 (Ta) = Agil, A'yil, Celvangāci, Kāndamūlai, Madagirvembu, Pallirukki, Tēvaganni, Vedivēmbu; (M) = Akil, Cuvannakil, Malavēppu; (K) = Davala, Gand'hamalar, Huruli. 201 (Ta) = Kolavu, Enneykkolavu, Kudaippāli, Madancāmbarāni; (M) = Curuli, Cuvannappayan, Kulayu, Uram; (K) = Enne, Hennuyenne. 231 (Ta) = Attanāri, Calangalumā, Palāngādai, Kāttukkongai; (M) = Cettari, Nakkampakam, Irattiyan, Muttukkonka. 232 (Ta) = Nadilai, Kullumā, Kongai.

Under 1 *foot diameter of the same category.*—595.

Exhibits.—114 (l. and s. panel, l. and s. block). 124 (s. block). 125 (s. block). 126 (s. block). 132 (l. panel l. and s. block). 232 (l. and s. panel, l. and s. block).

(37) VENTEAKS—

	W.	P.	S.	D.	T.	A.	VC.	Localities.
274. Lagerstroemia lanceolata (M)	44	607	2	2	1	2	II	MPLT., CNTC., WGTS.
275. Lagerstroemia flos-Reginae.	44	703	3	2	1	3	II	KAN.-TRY. Rvrs.

Uses.—274 (moderately hard, elastic, very fissile, durable except when long exposed to the weather, white-ants attack the sap but not the heartwood, apt to split and warp, works easily and polishes well—Bed. Gbl. Bdn.), building, rafters, flooring, planking generally, shingles (good), ship-building, furniture, coffee-cases (good) (Bed. Gbl. Bdn.). 275 (durable, especially under water but not under ground, elastic, fissile but not so much so as 274, liable to grow crooked and knotty, does not crack and warp so much as 274, works easily and takes fine polish—Bed. Gbl. Kurz. Bdn.), building, posts, beams, rafters, joists, planking, ship and boat building, hulls of canoes and fittings—paddles and oars—of boats, gun-carriage work—light and heavy cheeks, most in demand after teak, spirit casks, cart-making (Bed. Gbl. Kurz. Bdn.); the crooked and knotty parts should be excellent for cabinet-making (see Birch—F.W.; 26 Maple—F.W.; 55, Sycamore—F.W.; 56, etc.—A.W.L.).

European timbers quoted.—This category has considerable resemblance to the Chestnut (F.W. 47) in its elasticity and fissibility; it is redder, slightly heavier and of considerably greater transverse strength, and has much finer, but very numerous, medullary rays.

Vernaculars.—274 (Ta) = Vendēkku, Venveyila, Kaccaikkatti; (M) = Ventēkku, Vellilāvu, Vendan, Vengulam, Cennāli; (K) = Bendēku, Aunnate, Belaunnate, Nandi, Bibinandi, Tavaunnate. 275 (Ta) = Pūmarudu, Kadali, Kadalimugai, Kadlippū; (M) = Nīrventēkku, Pūvalaventēkku Nīrmarutu, Manimarutu, Cemmarutu; (K) = Nīrbendēku, Vāribendēku, Calla, Holecalla, Maruvācalla Holematti.

Under 1 *foot diameter of the same category.*—(None.)

Exhibits.—274 (l. and s. panel, l. block). 275 (s. panel l. block).

(38) False Pears—

No.	Name	W.	P.	S.	D.	U.	A.	VC.	Localities.
	i. *Open-grained.*								
135.	Strombosia ceylanica	..	...	3	2	2	4	III	WGTS., KAN.-TRV. scat.
136.	Anacolosa densiflora.	44	630	3	2	2	3	III	TVY., TRV., Anms.
138.	Apodytes Benthamiana.	...	...	4	2	3	3	III	NLGS., Anms., TRV., TVY.
139.	Apodytes Beddomei.								Nlgs., KAN.-TVY.
150.	Zizyphus jujuba.	50	583	4	3	2	2	III	Most dist. dtts.
217.	Acacia arabica ...	54	880	3	2	2	1	II	Most dist. abdt. on bctn.
430.	Aporosa Lindleyana.	41	515	4	3	3	2	IV	WFTS., CRG.-KAN., com.
	ii. *Close-grained.*								
147.	Pleurostylia Wightii (M.).	51	...	5	3	3	2	IV	Most dist., dtts. open for.
289.	Viburnum punctatum (var. acuminatum).	49	...	5	3	3	3	IV	NCCS. (Agt.), MPLT., WFTS.-KAN.-TRV. NLGS., Anms., Pnis.
438.	Mallotus philippinensis.	47	361	4	3	3	2	III	Most dist., dtts. com.

Uses.—135 to 1390 (dubtfully inserted in this class, information about them being very scanty). 135 (wood white and durable, but I have only a poor specimen—Bed.; wood yellowish-brown, rather soft shining—Trimen; wood hard but brittle, sapwood whitish not durable, heartwood pinkish-brown to dark reddish-brown, grain straight or slightly crossed, texture very fine, smooth, seasons with little warping, but subject to internal checking in logs or large pieces, easy to work taking a very smooth silky surface under a sharp plane, durability at least II, rarely if ever attacked by beetles—Schneider) (no uses reported in India), poles, piles, joists, beams, rafters, studs, ties, mine timbers, axe handles, chisel and similar tool handles, canes, flooring, window-sills, furniture and cabinet-work (Schneider). 136 (wood grey-pink to light red, said to spilt badly and not used,

—Gbl. Bdn.; in Tinnevelly it is said to be superior to Dichopsis elliptica—A.W.L.). 138, 139 (no remarks on qualities, nor uses given). 150 (wood pale red darkening on exposure, tough, durable—Bed. Bs. Gbl. Kurz.), buildings, well-curbs and Persian wheels, oil-crushers, cabinet-work, agricultural implements, saddle-trees, bedstead-legs, tent-pegs, sandals (Bed. Bs. Gbl. Kurz.). 217 (wood pink-red darkening on exposure, tough and very durable if water-seasoned—Bed. Bs. Gbl.), building especially rafters, ship and boat building—kneed timbers, railway sleepers, well-curbs, sugar, rice and oil-presses, naves spokes and felloes of wheels, agricultural implements, especially plough-shares, mallets, axe handles, tent-pegs (Bed. Bs. Gbl.). 147 (wood light red or yellowish red, a very pretty wood—Gbl.), combs, (Gbl.). 289 (no remarks and no uses given, wood light red; Mathieu says that it approaches the Pear in colour and fineness of grain). 438 (wood light-red, no remarks nor uses).

European timbers quoted.—In colour and weight these timbers closely approach the Pear (F.W. 41); the close-grained sub-category are as near in structure as could well be, the open-grained sub-category are rather larger, pored and rayed, but from their mode of utilization it seems that they too could be used as substitute for the Pear.

Vernaculars.—135, 138, 139 (no names known). 135 (Ta) = Kalmānikki, Kalpottan, Kattuvekkāli; (M) = Kalmānikkam, Kaiyati, Malankāra, Kānyan, Nettamatukku, Kānamatukku. 150 (U) = Bodokōli, Kōli, Boderī; (Tl) = Rēgu; (Ta) = Ilandai; (M) = Lanta; (K) = Eaci, Bore. 217 (U) = Bābulo; (Tl) = Nallatumma; (Ta) = Karuvēlam; (M) = Karuvēlakam; (K) = Karijāli. 430 (Ta) = Vittil, Kottili; (M) = Eccil, Vetti, Vittil, Kottili; (K) = Sarali. Close-grained:—147 (Tl) = Kunticinta, Kāralli, Pāiri; (Ta) = Pairi, Cirubiyari.

289 (Ta) = Konargāram; (K) = Hēlusunde. 438 (U) = Sindūrogundi, Bosontogundi, Kunkumo; (Tl) = Kunkumu, Sinduragundi, Vasant' hagand'hamu; (Ta) = Kabilappodi, Kurangumancanārri; (M) = Kappila, Mannana, Pīponnakam, Kurukkutti; (K) = Kapile, Kunkumu, Punnāga.

Under 1 *foot diameter of the same category.*—592.

Exhibits.—150 (s. panel, l. and s. block). 217 (l. and s. panel, l. and s. block). 430 (s. panel, s. block). 147 (s. block). 438 (s. panel, l. block).

(39) SAPODILLAS AND MANGROVES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
315. Sideroxylon tomentosum (H. on hills; M. on plains).	56	...	4	2	2	3	III	NCCS. (Agt.), WFTS., esp. NLGS., Anms., Pnis.
316. Isonandra lanceolata.	53	...	5	2	3	3	IV	CDP., CRG.-TRV., NLGS., Anms.
319. Bassia longifolia (M.).	61	737	3	2	1	3	III	WFTS., KAN-TVY., MYS.-SLM.
320. Bassia malabarica.	47	471	5	3	3	3	IV	KAN.-TRV., Anms., rvrs.

Uses.—(Wood yellowish to light reddish brown, esteemed, fibrous, liable to split—Bed. Gbl. Kurz.—grain straight, texture dense and smooth, seasons well though rather liable to splitting at ends, not difficult to work—Schneider), building (beams, splits too much for planks), carpenters' planes, good for turning (Bed. Gbl.), pretty ornamental wood for cabinet-work and turned or carved articles (Schneider). 316 (wood light reddish-brown, a useful timber—Gbl.), door-panels (Gbl.). 317 (wood red, very flexible, straight-grained, durable scarcely inferior to teak—Bed.), building and house-posts, bridges, ship-building, keels, planking below the waterline and trenails, furniture, cart-building where strength is required (Bed. Gbl. Bdn.). 320 (wood dark-red, no remarks nor uses recorded).

European timbers quoted.—These do not seem to correspond truly with any European species, but perhaps

might be considered intermediate between the Plum (F.W. 35) and the Maritime Pine (F.W. 29); they resemble the Plum fairly well in colouring, weight, and structure, and the Maritime Pine in durability, dimensions and utility.

Vernaculars.—315 (U) = Kontābohulo, Gudyā; (Tl) = Bejjuven; (Ta) = Mulmagil, Pālai; (K) = Hāle, Kumpāle, Hudugolla, Kalmad'hu. 316 (Tl) = Kondayippa, Peddayippa; (Ta) = Valukkanu. 319 (Ta) = Iluppai, Nattiluppai; (M) = Irippa; (K) = Ippe, Sannayippe, Hūli. 329 (Ta) = A'rriluppai, Vanci; (M) = A'rriripp; (K) = Nānele, Hūlinānele.

Under 1 *foot diameter of the same category.*—(Mangroves): 668, 670 and 671.

Exhibits.—315 (s. panel). 319 (s. panel, l. block). 390 (l. and s. panel, s. block).

(40) SERVICE CHESTNUTS—

	W.	P.	S.	D	U.	A.	VC.	Localities.
25. Scolopia crenata.		..	4	2	2	3	III	NCCS. (Agt.), WFTS., NLGS., Svys.
26 Flacourtia cataphracta.	54	811	4	2	2	3	III	NCCS. (Agt.), WGTS., MPLT.
27. Flacourtia Ramontchi.	52	...	5	2	2	2	III	Most dist., dtts.
151. Zizyphus xylopyra.	52	800	5	3	2	2	III	Most dist., dtts.
216 Acacia planifrons.	...	...	5	3	2	3	IV	SAC.-TVY.
218. Acacia leucophloea.	55	861	4	3	2	2	III	Most dist., dtts. Most dist., open forests.
271. Careya arborea	53	688	5	2	2	2	III	
280. Homalium tomentosum.	54	879	3	2	1	4	II	NCCS. GJM.
281. Homalium zeylanicum.	48	777	3	1	1	3	II	KAN.-TVY., NAC.
298. Wenlandia Notoniana.	53	...	4	3	2	3	III	KAN.-TVY., MPLT.
299. Wendlandia angustifolia.	...	...	...	..	..	..	...	

Uses.—25 (wood, reddish-brown, first-class wood, very dense, hard to cut and saw, warps in planking,—Bed. Gbl.—seasons with little warping but liable to check

internally, fairly easy to work, durability at least II, not attacked by beetles—Schneider) (no uses recorded in India), posts, beams, joists, rafters, flooring, interior finish (Schneider). 26 (Wood, red or orange-red, takes a fine polish—Gbl. Kurz.), (no uses recorded). 27 (Wood red, straight and even-grained, durable and is not attacked by insects, does not warp—Bs. Gbl.), small building scantlings, agricultural implements, especially ploughs, turnery-work (Bed. Bs. Gbl.). 151 (Wood, reddish or yellowish-brown, durable, easily worked—Bs. Gbl.), small building scantlings, agricultural implements, especially ploughs, cart-building (Bs. Gbl.). 216 (Sapwood, white heartwood red, very strong, very tough, —even branchlets difficult to break, A.W.L.—, serviceable—Bed., Bs. Gbl.), agricultural implements (Bed. Bs. Gbl.). 218 (Sapwood large, heartwood reddish-brown to brick-red, strong, close- and fine- grained, somewhat brittle but tough, sapwood perishable and eaten by insects, heartwood durable, seasons well, takes fine polish—Bed. Bs. Gbl.), (no uses given). 271 (Sapwood, large, whitish, heartwood dull red to claret, tough, flexible, close and even-grained, strong, durable, stands well under water, rather difficult to season, apt to split, takes fine polish—Bed. Bs. Gbl. Kurz.), house-building, posts and planking, well-curbs, cart-framing, cabinet-making and furniture (resembling Mahogony), (gun-stocks, sepoys' drum framing—Bed. Bs. Gbl. Kurz., Madras Mail). 280 (Wood brown to very dark red-brown, very close grained, durable, splits in seasoning, takes very fine polish—Gbl. Kurz.), furniture, teeth of harrows (Gbl. Kurz.). 281 (Wood greyish - red tored, very strong, not attacked by insects, inclined to split in seasoning—Bed. Gbl.), grain straight or slightly crossed, texture dense smooth, seasons fairly well checking and warping but little, hard to saw but not difficult to shape or surface, durability I, rarely attacked by termited and

very slowly by (teredo, Schneider), building (Bed. Gbl.), piling, ship-wharf-and bridge-building, posts, sills, poles, ties, paving-blocks, floors, interior finish, sash, furniture and cabinet-work (Schneider). 298, 299 (Wood red, very good and strong—Bdn.), small buildings (Bdn.).

European timbers quoted.—Although so little appreciated in this country these form a very high class of timber, and they have very largely the qualities of the very much sought after service (F.W. 63); the weight, toughness, and structure is much the same, whilst in colour it blends that with that of the Chestnut, with which it also accords in being a structural timber.

Vernaculars.—25 (Ta) = Kōdali, Tarunai; (M) = Caralu; (K) = Jabbale, Doddajabbale, Attakajabbale, Kokkara, Heccarulu. 26 (Tl) = Talisapatramu, Kūragāyi; (Ta) = Caralu, Tālicam, Vayangārai; (M) = Tālisam, Kānci, Vāyakkattam; Caralanka; (K) = Tālisapatri, Cancali, Goraji, Kirinelli. 27 (U) = Bonico; Potuābonico; (Tl) = Kānarēgu, Bontakānarēgu, Nakkanarēgu, Nakkanērēdu; (Ta) = Cottaikkūla, Malukkārai; (K) = Gajalu, Hettarimullu, Mullutari, Nāyibēla. 151 (U) = Goto; (Tl) = Gotti, Rēgotti; (Ta) = Kottai, Kottaiyilandai; (M) = Kotta, Cottukkotta; (K) = Gotte, Cottemullu, Doddacotte, Kodaci. 216 (Ta) = Kudaivēl, Kudai, Udai; (K) = Odajāli. 218 (U) = Guāriā; (Tl) = Tellatumma; (Ta) = Velvēlam; (M) = Velvēlakam; (K) = Bilibēla, Nāyibēla, Toppalu. 271 (U) = Kumb'hī; (Tl) = Kumb'hi, Dudippa, Gādava, Buddabūrija; (Ta) = Ayma, Kalkumbi; (M) = A'lam, Pēlu, Pīlu; (K) = A'lagavvele, Gavvahannu, Gavvele, Doddāla, Daddal. 280 (no names known). 281 (Ta) = Kalviracu; (M) = Mantalamuk'hi; (K) = Kal. 298, 299 (Tl) = Konkupuccu; Tellapuccu; (Ta) = Vellaittāl, Kadambam; (M) = Tuvara, Pūvu; (K) = Bettadakammagaggara, Candukāra, Koyini, Nīrpare.

Under 1 *foot diameter of the same category:*—504, 591, 657, 658, 665, 666, 685, 692, 707, 708, 709, 710, 711, 777, 785, 786 and 813. (40-a) SERVICE FLAX. 531.

Exhibits.—25 (s. panel). 151 (s. panel, l. block). 216 (l. and s. panel, l. block). 218 (l. and s. panel, l. and s. block). 271 (l. panel, l. block).

(41) LITCHIS, OR CEYLON OAKS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
154. Erioglossum edule.	...	...	4	1	2	4	III	NCCS., SLM., scat.
155. Schleichera trijuga.	66	834	1	1	1	2	I	Most dist. common.
157. Nephelium longana.	58	1061	4	1	2	2	II	KAN.-TVY., MYS., Anms., com.
158. Nephelium stipulaceum.	60	686	4	1	2	3	II	MBR., TRV., Anms., com.

Uses.—154 (Wood white or pale-coloured with pinkish-brown or chocolate coloured heartwood, strong and durable, Bed. Rox. Kurz., Gamble says grey soft 34 lb., but admits that his specimen was not representative), house-building (Kurz.), a variety of purposes (Bed.) (seems similar to 157, 158—A.W.L.). 155 (wood very hard, sapwood whitish, heartwood light reddish-brown, one of our most valuable timbers and valued where strength, hardness and durability are required, close-grained, very durable, seasons well and takes fine polish—Bed. Bs. Gbl. Kurz.), building, especially good for oil rice and sugar crushers, pestles and mortars, rollers, screws, cart-building (especially wheels), agricultural implements especially teeth of harrows and ploughs (Bed. Bs. Gbl. Kurz.). 157, 158 (Wood red, hard to very hard, durable, takes fine polish—Bed. Gbl. Kurz. Bdn.), little used but good for furniture (Gbl. Kurz.); (Nephelium: grain slightly crossed, texture fine, very dense and smooth, seasons well, difficult to work but takes a beautiful surface under sharp tools, durability I, very rarely attacked by insects), posts and sills, beams, joists, rafters, flooring, burrs in native rice-mills,

teeth of cogwheels in primitive sugar-mills, presses, etc., bearings, wooden anchors, combs, trenails, harrow-teeth and other parts of agricultural implements (Schneider).

European timbers quoted.—No European representative, but it partakes of the qualities of the Hornbeam (F.W. 54) combined with the Service (F.W. 63), and with much greater strength and durability than Oak (F.W. 44).

Vernaculars.—154 (U) = B'homuniā, Muktimāyā ; (Tl) = Ishikarāsi, Tavati, Undurungu ; (Ta) = Kōrali, Manippungu. 155 (U) = Kusumo ; (Tl) = Būsi, Cāgalaposku, Posuku, Kodalipulusu, Madakapulusu, Pulisari ; (Ta) = Pūvam, Cākkattai, Koncivanci, Mirugukkottai, Mudgottān ; (M) = Pūvan, Cāna ; (K) = Sāgade, Kākuta, Hulimaya. 157 (Ta) = Pūvam, Kāttuppūvam, Varattarbūvam ; (M) = Pūvan, Malappūvan, Cempūvan, Porippūvan, Mullai ; (K) = Kānakantali, Malahākuta. 158 (Ta) = Kānamayilai ; (M) = Pūvan, Kalpūvan, Kānamayilai, Payivirimuli.

Under 1 *foot diameter of the same category.*— (None).

Exhibits.—155 (l. and s. panel, l. and s. block). 157 (s. panel, s. block). 158 (s. panel, s. block).

(42) RED EBONIES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
326. Diospyros pruriens.	...	...	4	2	2	3	III	WGTS., KAN.-TVY., Anms.
329. Diospyros toposia.	...	...	4	2	2	4	III	TVY., TRV.
335. Diospyros microphylla.	49	581	3	2	2	3	III	WGTS., KAN.-TRV., Anms.
340. Diospyros Candolleana.	56	...	4	2	2	3	III	NCCS. (Agt.)., KAN.-TRV., NLGS.

To these must be added, from Cat 56, 333 D. assimilis and 338 D. tomentosa (including D. melanoxylon) when the black heartwood therein is not developed.

Uses.—326 (Wood white tinged with yellow turning red on exposure). 329 Wood-red when freshly felled deepening to reddish-brown on exposure). 335 Wood red-

dish-grey. 340 wood light pink sometimes with grey streaks or lines; no other qualities or uses recorded except. 335 young trees-walking sticks (Bdn.); see remarks on Category 35. WHITE EBONIES.

European timbers quoted.—As in the case of the White Ebonies, the structure resembles that of the Pear (F.W. 41), but in this case even the colouring also agrees.

Vernaculars.—326 (no names known). 329 (Ta)=Tuvarai, Karunduvarai. 335 (Ta) = Cinnattuvarai, Malligaittuvarai; (M) = Kattuttuvara, Tuvarakkari, Ilaccivicca, Cōrakkari. 340 (U) = Koduāmoriyo; (Tl) = Tadār; (Ta) = Karikkattai; (M) = Kari; (K) = Kari.

Under 1 *foot diameter of the same category*:—(None.)

Exhibits.—(None.)

(43) ELM MYRTLES—

	W	P.	S.	D.	U.	A	VC.	Localities
244. Eugenia Munronii-mundagam.	41	675	4	2	2	3	III	WGTS. KAN.-TVY., NLGS.
245. Eugenia aquea. ...	...	...	5	2	2	4	IV	TVY., TRV.
246. Do. Beddomei.	...	...	4	2	2	4	III	CBT. (Anms).
247. Do. hemispherica.	...	...	2	2	1	3	II	TVY., TRV.
248. Do. cylindrica.	..	...	4	2	2	4	III	WGTS., CRG.-TRY. Anms. TVY.
250. Do. Arnottiana.	57	594	2	2	1	3	II	WFTS., NLGS., Anms. Pnis. TRV.
251. Do. Wightiana.	...	...	4	2	2	3	III	KAN.-TRV., NLGS., MRA.
252. Do. zeylanica ...	..	..	5	2	2	3	III	WGTS., KAN-TVY., rvrs.
253. Do. montana ...	42	469	4	2	2	3	III	WGTS., NLGS., TRV.
254. Do. Gardneri (VH).	68	865	2	2	1	3	II	WGTS., KAN.-TRV., Anms.
255. Do. caryophyllaea (or corymbosa).	49	...	5	2	2	3	III	KAN.-TRV, NLGS., rvrs. and litl.
256. Do. utilis ...	...	...	3	2	1	4	III	KAN.
257. Do. revoluta.	.	...	4	2	2	4	III	NLGS.
258. Do. Myhendrae.	...	...	4	2	2	4	III	TVY., TRV.
259. Do. Neesiana ...	...	..	4	2	2	4	III	TVY., TRV.
260. Do. calophyllifolia.	45	...	4	2	2	4	III	NLGS.
261. Do. rubicunda (M).	39		4	2	2	3	III	WGTS., KAN.-TVY.

	W.	P.	S.	D.	U.	A.	VC.	Localities.
262. Eugenia malabarica.	...	...	4	2	2	3	III	KAN., MBR., Anms., shos and fswp.
263. Do. alternifolia.	58	...	3	2	1	3	II	KNL., CDP., NAC., CPT., SLM.
264. Do. operculata.	47	...	2	2	1	3	II	NCCS., (esp., GJM)., WFTS.
265. Do. Stocksii ...	...	...	3	2	1	4	III	KAN., MBR.
266. Do. jambolana (M).	47	585	3	2	1	2	II	Most. dist com. esp rvrs.
267. Do. floccosa ..	...	...	4	2	2	3	III	MPLT., TVY., TRV., Anms. Pnis.
276. Sonneratia apetala (M).	39	...	5	2	2	3	III	COCT., GDV.-SAC., litl. sswp.

NOTE.—254. Eu, Gardneri was previously erroneously called Hopea odorata in South Kanara.

Uses.—(Very scanty information recorded about this large class of trees, due largely to many being in at present inaccessible places, none gregarious, being unutilized; of them the following is recorded). 250, 254, 260, 263 (wood excellent), building. 253 building; planking. 264 building, agricultural implements. 266 building, posts, beams, rafters, sleepers, agricultural implements, well-work as it resists the action of water well. 276 parts of boats, planking, furniture, boxes (Bed. Bs. Gbl. Kurz. Bdn.); "Eugenia. (The woods of the larger, i.e., not the shrubby—species are fairly uniform in general appearance and structure; though very widely distributed, the trees of this genus are always scattered, and none of the large operators have so far attempted to keep the wood separate; sapwood greyish or palish brown often with yellowish or greenish tints rather sharply distinguished from the heartwood, which is generally of a greyish brown with greenish, yellowish or reddish tinge, grain somewhat crossed often wavy, texture fine even but dull, rather difficult to season, not difficult to work but dulls edge-tools rather rapidly, durability II, even sapwood rarely attacked by beetles), ship-bridge and wharf-building, piles, poles, ties, beams, joists, rafters and studs, flooring, window-sills, siding, furniture

and cabinet-work, agricultural implements, tool-handles, musical instruments (heavy parts, such as bases of harps and necks of guitars), rice-mortars and other house-hold implements" (Schneider); "Sonneratia: (heartwood light brown to dark chocolate when wet or under varnish of old maxture trees almost black, grain straight or very slightly crossed, texture fine very homogeneous smooth but not glossy, boards season fairly well but logs and heavy planks are liable to check internally, easy to work, rusts out small nails and screws on account of salt-content, durability II, even sapwood rarely attacked by insects and heartwood said to resist teredo very well), piles, posts, poles, ties, paving-blocks, ship-bridge and wharf-building, general strong construction, doors, siding, sheathing, ceiling, flooring and all kinds of interior finish, ship-planking and decking, furniture and cabinet-work, musical instruments" (Schneider).

European timbers quoted.—These take very largely after the Elm (F.W. 46) in qualities generally, colouring, slightly heavier in weight, structure much the same the pores being rather smaller, the properties of lasting under ground and under water, and the considerable durability.

Vernaculars.—The generic name is very loosely applied to almost all species; this is (U) = Jāmo; (Tl) = Nērēdu; (Ta) = Nāval, Nāgai; (M) = Nāral, Nēral, Cāmpa; (K) = Nērale; other than this no names are known for 245, 246, 251, 257, 258, 259, 260, 265, 244. (Ta) = Aiva, Ilambili, Kāttuccāmabal; (M) = Mōttu, Kāttuccāmpa, Muntakam. 247 (Ta) = Vellaināval; (M) = Payanāval, Vellannāral, Vennāral, Nāral; (K) = Bananērale, Mattanērale, Nāyinēralu, Makkinērale. 249 (M) = Vellaccampakam. 250 (Ta) = Nāval, Nāgai, Cirunāgai, (M) = Airi; (K) = Nāge. 252 (Ta) = Murungi, Pūvalā (M) = Pūvalā, Veluttannāral; (K) = Guddenērale, Kunnērale,

Jogiparndu. 253 (M) = Poriyila ; (K) = Payannērale, Pūnāge. 254 (Ta) = Nīrnāval; (M) = Malannēral, Cennaral, Karunnaral; (K) = Bilitirupu. 255 (Ta) = Malinaval ; (M) = Kīlakkannāral; (K) = Kempukuntāla, Kuntāle, Kuntunēralu, Nēralukuntāle. 256 (K) = Hennērale. 261 (Ta) = Cirunāval; (M) = Nāral. 262 (M) = Ceriyannāral, Nāttujambu; (K) = Cikkanēralu, Nērale, Kuntunērale. 263 (Tl) = Mōvi, Mancimōvi; (Ta) = Mōvi, O'ranavāl, Cōranāval, Tidbērā. 264 (U) = Monisiājāmo; (M) = Nāral. 266 (U) = Jāmo ; (Tl) = Nērēdu, Nēredu; (Ta) = Nāgai, Nāval, Kottaināgai, Kottaināval; (M) = Nāga, Nāval, Perinnāral; (K) = Nērale, Nēralu, Nāyinērale, Jambunērale. 267 (K) = Simpinērale. 276 (Tl) = Kalinga; (Ta) = Maraimā.

Under I *foot diameter of the same category*:—679, 680, 681 and 781.

Exhibits.—250 (l. and s. panel, l. block). 254 (l. and s. panel, l. block). 263 (s. panel, l. block). 266 (l. and s. panel, l. and s. block). 273 (s. panel).

B.—Yellowish with red heart.

(44) GAMBOGES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
(i) Hard—								
32. Garcinia indica.	49	...	3	2	1	3	II	CRG. MBR.
33. Garcinia cambogia.	50	608	3	2	1	3	II	WGTS., WTCT., NLGS., TVY.
34. Garcinia echinocarpa (R).	53	935	2	2	1	3	II	TVY., TRV., com.
38. Garcinia spicata.	61	942	3	2	1	4	III	NEL., CPT., WGTS., scat.
39. Ochrocarpus longifolius (R)	50	...	3	2	1	4	III	WGTS. (esp. NLGS.), MYS., scat.
45. Poeciloneuron pauciflorum (R).	..		4	2	2	3	III	TVY., TRV.
(ii) Very hard—								
35. Garcinia morella.	50	772	4	2	2	3	III	WTCT., KAN.-TRV., scat.
36. Garcinia travancorica.	52	535	4	2	2	4	III	TVY., TRVG., scat.
37. Garcinia xanthochymus (R)	57	546	4	2	2	3	III	NCCS , (Agt)., WGTS., CRG., NLGS.
44. Poeciloneuron indicum (R).	60	928	3	2	1	3	II	KAN.-MBR. rvrs.

Uses.—Again the record is scanty; about 32, 35, 36, 38 and 39, no remarks about the quality nor uses are given, whilst in 37 it is stated that the wood is strong and good but not used). 33 common furniture (Bed. Gbl.). 34 (timber valuable, fissible), shingles (Bed. Gbl. Bdn.). 44 rice-pounders, endeavours made to introduce it for sleepers and paving blocks which looked very suitable (Gbl.). 45 building, walking-sticks (Bfd. Gbl.), "Garcinia" it is impossible to say which species have yellow wood and which dark red, it is possible that most or all species have dark red heart-wood when old; sapwood very variable in thickness—some trees up to 30 centimeters in diameter show no distinct heart—yellow, sometimes merging gradually into heartwood, sometimes quite sharply distinguished from it, heartwood when distinct deep reddish-brown, grain straight texture fine dense glossy, seasons without warping much but liable to split, hard to saw but otherwise not difficult to work, durability II at least, especially the red varieties have excellent reputation for posts, not attacked by beetles), piles, posts, ties, paving-blocks, beams, joists, rafters, flooring, piling (Schneider). The species known to have red wood; in the above, have been marked (R).

European timbers quoted.—They appear to be intermediate between the Larch (F.W. 17) and the Olive (F.W. 64), the colouring and weight are both intermediate inclining rather more towards the Olive than towards the Larch, the transverse strength is considerably superior to that of the Larch and may be well due to the denseness of texture in which it approaches the Olive; they have, however, much larger pores and much broader medullary rays than either the Larch or Olive; they contain resin as Larch.

Vernaculars.—32 (M) = Kāttuppuli, Punampuli; (K) = Murginahuli, Punarapuli. 33 (Ta) = Korukkāyppuli;

(M) = Kotukkappuli, Kurukampuli, Kutampuli, Punnargam, Punnaru, Cikiri, Korugan ; (K) = Aradala, Arasinapulige, Esali, O'tekāyi, Hīla, Mandapuli. 34 (Ta) = Madul ; (M) - Pūra. 38 (Tl) = Pidata ; (Ta) = Cōlaikkodukkāppuli, Kōgottai, Mancalnāngu ; (U) Kādujarige. 39 (Ta) = Curabunnai, Curabunnāgam ; (M) = Surampunna ; (K) = Gād'havūnate, Ūnate, Punya, Punnāga, Suragi. 45 (Ta) = Pūdangōli ; (M) = Pulivayila. ii. Very Hard. 35 (Ta) = Colaippuli, Irēvalcini, Makki ; (M) = Makki, Kurukkampuli, Pinarppuli, Pulincakka, Valogam, Cikiri ; (K) = Aradala, Arasinagurce, Devinahuli, Jārigehuli. 36 (M) = Malambungu. 37 (Ta) = Malaippuli, Malaippacca, Paccalai ; (M) = A'navaya ; (K) = Dēvajārige, Gurce, Hirekanigu, Nēralemāvu, Vāte. 44 (Ta) = Pūdangōli ; (M) = Pūtankalli, Vayila ; (K) = Balige, Karbalāyi.

Under 1 *foot diameter of the same category.*—(None.)

Exhibits.—32 (l. block). 33 (l. panel, s. block). 35 (s. panel, l. block). 37 (s. panel, s. block). 44 (l. & s. panel, l. block). 45 (l. block).

(45) RED OLIVE ASHES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
(i) *Moderately hard*—								
74. Pterospermum suberifolium.	43	...	4	4	2	3	IV	NEL., CDP., NAC., SAC.
75. Pterospermum diversifolium } 80. Pterospermum obtusifolium }	44	...	4	4	2	4	IV	TVY.
77. Pterospermum reticulatam.	43	603	3	4	1	3	III	WGTS., MBR.-TVY.
(ii) *Hard*—								
48. Gordonia obtusa.	42	533	3	3	1	3	III	WFTS.,esp. NLGS. & Wnd.
78. Pterospermum Heyneanum.	45	603	4	3	2	3	III	NCCS., com.
82. Grewia excelsa ..	..		4	3	2	3	III	NCCS., DKN.
83. Grewia salvifolia	...	...	4	3	2	4	IV	GTR., CNTC.
84. Grevia orbiculata.	...	...	5	3	2	2	III	Most dist., dtts.
85. Grevia tiliaefolia.	45	660	4	3	2	2	III	Most dist.

(ii) *Hard*—cont.	W.	P.	S.	D.	U.	A.	VC.	Localities.
149. Elaeodendron glaucum.	51	572	*	3	2	*	III	* see below
353. Schrebera swietenioides.	57	...	4	3	2	3	III	Most dist., dtts., scat.
356. Olea glandulifera.	53		3	3	1	4	III	NCCS. (Agt.)., WFTS, scat.
357. Olea dioica ...	57	581	3	3	1	3	III	WFTS., KAN.-TRV., SLM.
(iii) *Very hard*—								
76. Pterospermum rubiginosum.	43	840	3	2	1	3	II	WGTS., MBR.-TVY., Anms.
81. Berrya Ammonilla.	54	818	3	2	1	4	III	MBR.-TRV., rare.
444. (bis) Gironniera reticulata.	...	...	4	2	2	4	III	WGTS., KAN.-TVY., rare.

Uses.—74 (tough—Bed. Gbl.), building. 75, 80 (Hooker shows that these are probably identical ; no remarks about quality nor uses reported in India ; "rather tough, heartwood dull purplish or reddish-brown fading on exposure, grain straight or slightly crossed, texture, fine, smooth, seasons well, easy to work, durability IV, but rarely attacked by beetles), posts above stumps, beams, joists, rafters, flooring, ceiling, sheathing, furniture and cabinet-work, household implements, combs, impregnated ties and paving blocks" (Schneider). 77 (not much used sometimes used for) boats (Bed.). ii — 48 (very elastic, even and close-grained,

* NOTE.—In the Nilgiri and Anamalais it grows into a large tree (III class) but is scattered (i.e., Abundance IV class) ; very common (A. II) in the dry tracts of most districts it is a small tree (V class)—see Bed.—whichever way it is taken the value class works out to III—A.W.L. 353. (Very close grained something like box, elastic, durable, seasons well without warping or splitting, easy to work—Bed. Bs. Gbl. Kurz.), weavers' looms, turning, combs (Bed. Bs. Gbl. Kurz.) ; 356 (close compact, durable and not attacked by insects, capable of taking a high polish—Bs. Gbl.), construction, carpentry, turnery, agricultural implements (Bs. Gbl.). 357 (an excellent strong valuable timber, Bed. Bdn. but no uses given). iii—76 (excellent handsome timber—Bed. Bdn.). house-building, boat-building (Bed. Gbl.). 81 (one of the best woods of Ceylon, tough and flexible, close-grained, very durable, but apt to split —Bed. Gbl.), boat-building, axles, poles and shafts of carts and carriages, ploughs and other agricultural implements.

easy to work and not unlike Beech in this respect, warps if not well seasoned--Bed. Gbl. Bdn.), building, beams, rafters, planks, doors (Bed. Gbl.). 78 (no qualities nor uses recorded, but considerably used in Ganjām and Kistna for purposes requiring an elastic wood, such as) small rafters, shoulder poles (A.W.L.). 82, 83, 84 (precisely the same here as in 78, but these are used in the Deccany districts from Kistna southwards), building, rafters, shoulder-poles (A.W.L.). 85 (elastic, fibrous, coarse-grained, durable, and though it contracts and expands much with dry and wet weather yet it is valuable where strength and elasticity are required, works easily--Bed. Bs.), building, cart and carriage-shafts, oars, masts, shoulder-poles, golf-clubs, walking-sticks, bows, axe and tool-handles (Bed. Bs. Gbl. Bdn.). 149 (tough, close-and even-grained, a pretty wood beautifully curled and flaked, durable, seasons well but requires careful treatment as thin planks are liable to warp, works easily and takes fine polish--Bed. Bs. Gbl.), small buildings, cabinet-work, picture-frames, combs (Bed. Bs. Gbl.), spear-handles (Gbl. Kurz.). 444 (bis), engineering construction, house-building, rafters and planks (Bed. Gbl.).

European timbers quoted.—Not quite so heavy nor with quite such transverse strength, nevertheless with their elasticity and toughness this category approaches the Ash (F. W. 53), whilst the smallness of the pores and the close even grain and fine smooth texture, and to a certain extent the colouring, give it some resemblance to the Olive (F. W. 64).

Vernaculars.—74 (U) = Gūreno, Gūpūti; (Tl) = Nārudu, Tada; (Ta) = Cembolavu, Cirrilaippolavu, Tadai, Vennangu. 75, 80. (M) = Mulipolāku. 77. (Ta) = Mūlarbolavu, Polavu, Tōrbolavu; (M) = Malavuram, Palakayunam, Tōlpuli, Nāyunnu; ii- -48 (Ta) = Miyilai; (M) = Alāngi, O'la; (K) Nāgatti. 78 (U) =

Bāilo; (Tl) = Lōluga, Nōlika, Duddika, Maccakanda; (Ta) = Polavu. 82 (U) = Homolopoto, Kūlo; (Tl) = Cīpuru, Mancicīpuru, Peddacīpuru. 83 (U) = D'hātoki, Kūlo; (Tl) = Kondacīpuru, Mancikōlupu, Narabudama, Tavatike, Kāda; (Ta) = Cavatalunnu, Nārōduppai; (K) = U'dippa. 84 (Tl) = Jāna, Nūlitada; (Ta) Uduppai, Neyccitti, Valukkunnu; (K) = Jāne, Karijāne. 85 (U) = D'hāmono; (Tl) = Jāna, Nūlitada, Tada, Inuputada, Erratada, Tadajāna; (Ta) Cadacci, Unnu; (M) = Catacci; (K) = Tadacali, Tadajāna, Tada, Buttele, Kanapadi. 149 (U) = Mok'hā, Pisitondoro; (Tl) = Nīrija, Nerisi, Kannīru; (Ta) = I'rgōli, Kiri, Karukkuvā, Karuvāli, Kannirai; (M) = Kanuniruka; (K) = Kannira, Mukkarite. 353 (U) = G'hontiā, Nemibulā; (Tl) = Bullakāyi, Mokkavēpa, Magalinga, Mukkidi; (Ta) = Magalingam; (U) = Ganta, Maggante, Kalgante, Bulā. 356 (Tl) = Lodājang; (K) = Kunde. 357 (Ta) = Idalai, Manidalai, Paravanidalai; (M) = Etala, Valiyavetala, Karivetala; (K) = Edala, Mahōdale, Hakkāsarali, Sāranūke, Pārujambu, Naravele; iii— 76 (Ta) = Cirrilaippolavu, Karundorbolavu; (M) = Cittālappolāku, Malantotali, Totali, Talavāri, Ponarika. 81 (Ta) = Cavandalai, Tirukkōnamalai; (M) = Kolla. 444 (bis) (no names known).

Under 1 *foot diameter of the same category.*—520, 521, 522, 523, 524, 525, 586, 691. (Subcat. 45-a; FALSE YEWS:—554, 555, 557, 560.)

Exhibits.—48 (l. & s. panel, l. block). 85 (s. panel, l. block). 149. (l. block). 356 (l. panel).

C. Yellow to Yellowish-brown.

(46) SOAPNUT—

	W.	P.	S.	D.	U.	A.	VC.	Localites.
156. Sapindus trifoliatus.	67	704	4	4	3	2	IV	Most dist. esp. bctn.

Uses.—156 (tough, close and prettily-grained, not durable, cracks if exposed, not easy to work,—Bed.) building, especially posts and doorframes, cart-construction oil-mills (Bed. Gbl.).

European timbers quoted.—In its toughness it resembles the Hornbeam (F.W. 54), but it has such a conspicuous yellow colour that in that respect it resembles the Spindle tree (see after F.W. 51), it is also heavier than Hornbeam (which is no defect for the purposes for which that species is used, but the contrary), nor has it the broad conspicuous false rays; it might perhaps be placed in Category 54, but it does not quite tally with either sub-category of that number. The sub-category of this, Barberries, tallies much more closely with the Spindle above referred to.

Vernaculars.—156 (U) = Muktāmonji; (Tl) = Kunkudu, Kūkudu; (Ta) = Pūdcikkottai, Manippungu, Nītta-vanci, Neykkottān, Ponnangottai; (M) = Cavakkāya, Paccakkotta, Ponnankotta, Pulinci, Urvvanci, Arishtam; (K) = Antarali, Antavāla, Arishta, Burugukāyi, Kūgate, Runde, Talemarudu, Nurekāyi.

Under 1 *foot diameter of the same category.*—(Cat. 46)—(none); (Subcat. 46-a)—494, 495.

Exhibits.—156. (L. & s. panel, l. block).

(47) FALSE WALNUTS—

	W.	P.	S	D.	U.	A	VC.	Localities.
(i) *Lighter*—								
222. Albizzia lebbek.	49	819	4	2	1	3	III	Most dist., dtta., scat.
223. Albizzia Thompsoni.	47	...	4	2	1	4	III	GJM., CDP., scat.
224. Albizzia odoratissima.	51	739	4	2	1	2	III	Most dist., com.
225. Albizzia procera.	46	744	4	2	1	3	III	Most dist., scat.
(ii) *Heavier*—								
227. Albizzia amara.	62	1284	4	1	1	2	II	Most dist. dtts.
237. Terminalia Arjuna.	55	813	1	3	1	3	II	Most dist. rvrs. scat.
238. Terminalia tomentosa.	60	842	2	3	1	2	II	Most dist. clay soils.

Uses.—(i)-Lighter: 222 (Tough, sapwood large not durable, heartwood durable, not liable to warp and

crack, seasons well, works freely, takes fine polish,—Bed., Bs., Gbl.), building, especially, houseposts, boat-building, furniture, well-curbs, sugar and oil-mills, pestles and mortars, wheel-work, especially, naves and spokes, fancy-work, picture-frames (Bed. Bs. Gbl.). 223 (has hitherto been confused with the other species). 224, 225 (Structure and uses similar to 222,—Bed. Bs., usually the sapwood is larger in 225 than in the other species, A.W.L.); "Albizzia procera (heartwood dark rich chestnut brown generally with conspicuous irregular darker and lighter bands, grain straight texture fine glossy, seasons well, easy to work, durability at least II, very rarely attacked by beetles), posts, poles, ties, sills, beams, joists, rafters, inside finish, agricultural implements, furniture and cabinet-work, carving, recommended for gun-stocks" (Schneider). (ii)-Heavier: 227 (Very handsome, strong fibrous and stiff, superior to Sal and Teak in transverse strength and direct cohesive power, close grained, very durable,—Bed. Bs. Gbl.), buildings, beams, etc., construction of carts and ploughs, usually cut for fuel—Bed. Bs., Gbl.); should be a beautiful wood for cabinet-work, A.W.L. 237 (apt to split in seasoning, not easy to work,—Bs. Gbl.), house-building, boat-building, carts and agricultural implements (Bs. Gbl.). 238 (Strong fibrous, elastic, durability uncertain,—"at least III," Schneider,—grain coarse and curly, does not season readily, apt to warp and crack,—Bed. Bs. Gbl.), house-building, boat-building, furniture, cart-wheels, rice-pounders, and not very good sleepers (Bed. Bs. Gbl.).

European timbers quoted.—The first group of this category has passed under the name of East Indian Walnut, whilst the last of the heavier group is known as Malabar Walnut; and in colouring the whole is very like the Walnut (F.W. 23) as well as in structure; they are harder than, and the lighter series somewhat, the heavier class considerably, heavier than the Walnut.

Vernaculars.—222 (Tl) = Dirisamamu ; (Ta) = Vāgai, Perumvāgai, Adukkavāgai, Kāttuvāgai ; (M)=Vāka, Kāttuvāka ; (K) = Bāge, Doddabāge, Hombāge, Sirisa, Doddasirisa. 223 (no names known). 224 (U) = Sirisi, Bonosirisi ; (Tl) = Cinduga, Bandicinduga, Telasu ; (Ta) = Vākai, Karuvāgai, Cilaiyuncai, Kalitturincil ; (M) = Vāka, Karuvāka, Pulivāka, Karintakara, Kunni ; (K) = Kādubāge, Pulibage, E'nubāge, Bettasujjalu, Bilivara. 225 (Tl) = Dirisanamu, Kondadirisanamu, Telladirisanamu, Ganaru, Tellacinduga ; (Ta) = Vāgai, Nallavāgai, Velvāgai, Cālaiyuncil (M) = Vāka, Kutamvāka, Vellavāka, Cālavāka ; (K) = Bage, Salabage, Salayudi, Belatu, Cikul. 227 (Tl) = Cigaru, Cika, Reni, Nallarēgu, Nallangi ; (Ta) = Turincil, Uncil, Ucil ; (M) = Cūlivākā ; (K) = Sujjalu, Tuggali, Belukambi. 237 (U) Orjuno ; (Tl) = Tellamaddi, E'rumaddi ; (Ta) = Marudu, Vellaimarudu, A'rrumarudu ; (M) = Marutu, Vellamarutu ; (K) = Bilimatti, Holematti, Nīrmatti, Toamatti. 238 (U) = Sahajo, Kolasahajs ; (Tl) = Maddi, Nallamaddi, Inumaddi ; (Ta) Marudu, Karumarudu, Karuppumarudu, Kalimarudu ; (M) = Marutu, Karimarutu ; (K) = Matti, Karimatti, Hebhuluve, Banapu.

Under 1 *foot diameter of the same category*—(None).

Exhibits—222. (l. & s. panel, l. block). 224. (s. panel, l. & s. block). 225. (s. panel). 227. (l. & s. panel, l. & s. block). 237. (s. panel, l. block), 238. (l. & s. panel, l. block).

(48) False Elms.—

	W.	P.	S.	D	U.	A.	VC.	Localities.
235. Terminalia belerica.	46	549	2	4	2	1	III	Most Dist. abdt.
236. (bis). Terminalia travancorensis.	51	1012	3	3	2	4	III	TVY., TRV., scat.
240. Terminalia paniculata.	54	632	3	3	2	2	III	CNTC, WGTS.
242. Anogeissus acuminata.	54	880	2	3	2	3	III	NCCS., GJM., GDV., com.
442. Holoptelea integrifolia.	40	...	3	3	2	3	III	Most dist. dtts. scat.

Uses.—235 Open and coarse grained, not durable, liable to be attacked by insects, steeping in water has the effect of making it more durable, easily worked,—Bed. Bs. Gbl.), house-building (in parts, in others a superstition against it), especially rafters and planking, canoes and dug-outs, plough-shafts, coffee-boxes, grain measures (Bed. Bs. Gbl.). 236 (bis). (little known, has the appearance of good sound timber,—Bdn.), not used. 240 (timber good, but not equal to 237 T. tomentosa improved by being kept under water—Bed. Gbl.) building especially planking (good), agricultural implements. (Bed. Gbl.) packing-cases and boxes in Malabar (A.W.L.). 242 (close-grained, strong and durable except that it will not stand alternations of wet and dry cracks and warps in seasoning (Bs. Gbl. not so, Bed.), hard to work but gives a smooth surface and takes a fine polish, (Bed. Bs. Gbl. Kurz.), building, interior work (Bed. Bs. Gbl. Kurz.). 442 (strong coarsely fibrous but rather close-grained, durability uncertain but sapwood soon attacked by beetles, takes a fine polish,—Bed. Bs. Gbl. Kurz.), building, carving, carts (good) (Bed. Bs. Gbl. Kurz).

European Timbers quoted.—The structure resembles that of the Elm (F.W. 46), and also the colouring though in some cases lighter, the weight too is nearly the same; from the remarks about 240, and in connection with seasoning 235, it would seem that the timber is durable if kept under water or in perpetually damp places.

Vernaculars.—235 (U) = Bāhādā ; (Tl) Tāndra, Tādi ; (Ta) = Tānri ; (M) = Tānni ; (K) = Tāri, Tāre, Sāndi, Sānti. 236 (bis). (Ta) = Cūlamarudu, Muruganci, Pēykkadukkāy ; (M) = Kāttukkatukkā, Pēkkatukkā, Sūlamarutu. 240 (51) = Nimiri, Pūlamaddi ; (Ta) = Puluvaimarudu, Puluvai, Pūmarudu, Venmarudu, Ilaikkadukkāy ; (M) = Pullamarutu, Vemmarutu ; (K) = Huluve, Honagalu, Maruve. 242 (U) = Pānsi ; (Tl) =

Pācimānu. 442 (U) = D'hārāngo; (Tl) = Navili, Peddanavili, Tapasi; (Ta) = A'vā, Vellāyā, Avali, Tabaci; (M) = A'vil, Aval; (K) = Kaladri, Tapasi, Rāhubija, Nilavahi.

Under 1 *foot diameter of the same category.*—(None).

Exhibits.—235 (s. panel, l. block). 240 (l. & s. panel, l. block). 442 (l. panel, l. & s. block).

(49) OLIVE DAMMERS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
51. Vatica Roxburghiana.	60	692	1	1	1	3	I	WGTS., KAN.-TRV.
52. Shorea talura ...	50	896	4	1	1	3	II	CDP., NAC., MPLT.
53. Shorea robusta ...	55	814	2	3	1	3	II	GJM., VZM.
54. Shorea tumbaggaia.	67	892	2	3	1	3	II	CDP., NAC.
55. Hopea parviflora.	61	800	1	1	1	3	I	WGTS., KAN.-TVY.
56. Hopea Wightiana.	54	...	1	1	1	3	I	WGTS., KAN.-TVY.
57. Hopea glabra ...	64	857	1	1	1	4	II	WGTS., KAN.-TRV. TVY.
58. Hopea racophloea.	...	...	1	1	1	4	II	MBR., TRV.
60. Balanocarpus utilis.	...	...	2	3	1	4	III	TVY., TRV.
61. Balanocarpus erosa.	..	...	2	3	1	4	III	TVY., TRV.

Uses.—51 (a first rate wood though little known in this country, and roy used because 55 has been so easily obtainable, best wood for under-ground purposes,—Gbl. Bdn.), "Vatica. (seasons well, warping and splitting less than the Hopeas, hard to saw and shape but fairly easy to surface, durability I, except sapwood which is large and poorer than any of the Hopeas), same uses as Hopea," (Schneider). 52 (the wood resembles that of Hopea than that of Sal or Thamba,—Gbl.), house-building, doors, panels (Bed. Gbl.). 53 (wood strong and tough with a remarkably fibrous and cross-grained structure, the fibres appearing interlaced, superior to Teak in transverse strength and direct cohesive power, very durable, but not quite so much so as Teak, and lasts an immense time under-ground or under water, sapwood is not durable and is eaten by white-ants, very difficult

to season, and with proper precaution requires to dry very slowly, and after it has been seasoned and set up it is apt to split and warp with a change of dry and wet seasons, and in wet weather increases 1/24 in bulk and correspondingly in weight, and it warps in plank, not easily worked, and when dressed it has a horny surface,—Bed. Bs. Gbl.; durability III,—Schneider), engineering construction, gun-carriage manufacture, house-building—beams, door- and window- posts, almost unequalled for sleepers, ship-building and river boats, bodies of carts, agricultural implements especially ploughshares (Bed. Bs. Gbl.). 54 (harder than that of Sal, but similar in structure and much smoother,—Gbl.), house-building, posts, rafters and door- frames, plough-handles, (Gbl.). 55 to 58 (for construction superior to, and more durable than Teak,—Bdn.), house- and bridge- building, beams and rafters, sleepers (too valuable,—Bdn.), gun-carriage building, dug-outs (Bed. Bdn.). "Hopea: (texture fine and dense with a translucent look like yellow horn, grain generally sharply crossed making the wood difficult to split radially and showing marked ribbon when surfaced, does not check badly but warps considerably if not properly seasoned, difficult to work but saws with a very clean surface, durability I except as regards teredo), all high grade permanent construction except salt-water piling, posts, beams, joists, rafters, bridges, wharfs, ship-framing and decks, flooring, hubs, spokes, felloes, axles, poles, single and double trees, etc., paving-blocks, cant-hook handles, capstan bars, levers of all kinds, cabinet-work, rail-road ties" (Schneider). 60, 61 (there is no record of the wood of these species, but they are rather of the type of 53 and 54 than of 56 to 58).

European Timbers quoted.—These species are in many respects very similar to the best Conifers, Larch (F.W. 17) or the best quality of Riga Fir (&. 2,18 Scotch Fir or

Red Deal), both in containing resin in good proportion which makes them very strong and very durable, and also in their capabilities of utilization, but their transverse strength is nearly double that of Riga Fir and half as much again as Larch, whilst their weight, colouring and the closeness of their texture brings them much nearer to the Olive (F.W. 64).

Vernaculars.—51 (Ta) = Tūbam ; (M) = Atakkappayan, Ceruppayan, Kalluppayan, Vellippayan ; (K) = Dūpa, Gugguladūpa, Uguludūpa. 52 (Tl) = Jālari, Jāri ; (Ta) = Cālāri, Tālāri, Tālūra ; (M) = Jāla; (K) = Jāla, Jalaranda, Bilibōvu, Kar. 53 (U) = Sāluā, Sodingi (young trees) ; (Tl) = Sāluvā, Guggilamu. 54 (Tl) = Tamba; (Ta) = Tanbai, Tanbugai, Karudanbai. 55 (Ta) = Irumbagam, Kōngu, Vellaikkōngu ; (M) = Urippu, Irimpakam, Kampakam, Pōngu ; (K) = Bōvu, Bōvige, Kirallabōvige, Tirupu, Niragālu. 56 (Ta) = Kōngu ; (M) = Vellurippu, Ilappōngu ; (K) = Kalbōvu, Hiribōvige, Hegge, Unni, Kar. 57 (Ta) = Karaikkōngu ; (M) = Ilappōngu ; (K) = Malehegge. 58 (Ta) = Neduvārgōngu, Karungōngu ; (M) = Kolalu, Nākkampakam, Netuvālpōnku. 60 (Ta) = Karungōngu. 61 (Ta) = Karungōngu.

Under 1 *foot diameter of the same category* :—(None).

Exhibits.—52 (l. panel). 53 (l. & s. panel, l. block). 55 (s. panel, l. block). 56 (s. panel, l. block).

(50) WHITE CEDARS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
21. Hydnocarpus alpina.	40	..	3	3	2	3	III	WGTS. esp. NLGS.
118. Dysoxylum malabaricum.	48	992	1	2	1	3	II	WGTS., CRG.-TVY., Anms.
128. Heynea trijuga (M).	54	...	5	3	2	2	III	Agt. MPLT., NLGS., WGTS.
129. Beddomea simplicifolia (?)	...	...	5	3	2	4	IV	WGTS., CRG.-TVY., scat.
376. Stereospermum chelonoides.	47	703	4	3	2	2	III	Most dist.
377. Stereospermum suaveolens.	46	...	4	3	2	3	III	Most dist. scat.

	W.	P.	S	D.	U.	A.	VC.	Localities.
378. Stereospermum xylocarpum VH.	43	785	4	3	2	3	III	MPLT., CNTC., WGTS. scat.
379. Pajanelia Rheedhi (VH)	53	...	3	3	2	4	III	WGTS., KAN.-TRV.,CBT. scat.
427. Cyclostemon macrophyllus.	52	..	3	3	2	3	III	WGTS., CRG.-TRV., Anms.
428. Cyclostemon malabaricus.	54	...	4	3	2	4	IV	TVY., TRV. scat.

Uses.—21 (fissile, a fair wood, light brown with darker streaks, —Bed. Gbl. Bdn.), beams, rafters, packing-cases (Bed. Gbl. Bdn.). 118 (wood yellow to orange with silvery lustre scented, very strong, liable to warp unless kept moist, —Gbl. Bdn., grain commonly wavy giving beautiful changeable silk effects, texture fine dense smooth, seasons well, works easily, durability at least II even sapwood rarely attacked by beetles—Schneider), house-building, furniture, oil-casks (Gbl. Bdn.), posts, beams, joists, rafters, ties, flooring, window-sills, windows, doors, furniture and cabinet-work (should be more used for this purpose—Schneider). 128 (wood yellowish-white, no other details nor uses, —Gbl. Bdn., appears to resemble 118, but not so hard nor large, A.W.L.). 129 (very little known about this, no remarks on quality nor uses). 376 (wood light yellow to orange or tawny brown sometimes with brighter patches, elastic, close- and even- grained, durable, easy to work, takes fine polish, Bed. Bs. Gbl. Kurz. Bdn.), building, furniture (good), canoes, tea-boxes (Bed. Bs. Gbl. Kurz. Bdn.). 377 (wood very similar to the last but a little redder and often beautifully mottled, much esteemed, strong durable, (Bed. Bs. Gbl. Kurz.), building, (Bs. Gbl.). 378 (wood very hard orange brown, elastic, tough, close-grained, takes good polish, deserves to be better known and in more general use—Bed. Gbl.), cabinet-work, cart-poles and shafts (Bed. Gbl. Bdn.). 379 (wood very hard orange brown, elastic close-grained but somewhat coarsely fibrous, a fine wood which deserves to be

better known (Gbl. Bdn.), canoes and dug-outs (Gbl. Bdn.). 427, 428 (no remarks on qualities nor uses recorded). "Cyclostemon (wood creamy yellow to light brown mottled, grain very straight, texture fine dense very smooth, seasons badly in log staining considerably and splitting very deeply at ends, but if sawn while fresh and carefully stacked seasons with little staining and checking, not hard to saw and for a hard wood rather easy to shape and surface, durability III but not attacked by beetles), posts above stumps, bears, joists, rafters, flooring, interior finish, moldings, etc." (Schneider).

European timbers quoted.—This category appears to resemble somewhat the White Mulberry (F.W. 33) or Olive (F.W. 64) in hardness and colour, and the Birch (F.W. 26) in structure, intermediate between them in weight.

Vernaculars.—29 (Ta) = A'rruccancalai, Vattai, Malaivattai; (K) = Maratattu, Surante, Sannasurante. 118 (Ta) = Vellaiyagil; (M) = Vellakil, Pūrippā; (K) = Bilibudlige, Bilidēvadāri. 128 (Ta) = Cendurai, Karai, Karaivilangu; (M) = Karitoranam, Kurukkāti, Conakil. (K) = Kora, Līnabira. 129 (no names known). 376 (U) = Pātolī; (Tl) = Goddalipulusu, Ishakarāsi, Kaligottu, Mogavēpa, Tagada; (Ta) = Pādiri, Pādalam, Ponbādiri; (M) = Kariyāyi, Karinkara, Pātiri; (K) = Hādiri, Karivudure, Malevudure, Puruli, Najudi, Tagada. 377 (U) = Pātolī; (Tl) = Kaligottu, Kokkasa, Pātali, Vivi; (Ta) = Pādiri; Pūmbādiri; (M) = Patiri, Puppatiri; (K) = Hādiri, Hūde, Hūlave, Kariguddadu. 378 (Ta) = Vedanguranai, Kadalātti, Mānkombu, Pādirīmilaidai; (M) = Pātiri, Vetankāruna; (K) = Ambalahūde, Hūde, Hūlave, Kēnanakombu.

Under 1 *foot diameter of the same category.*—615, 621, 622, 626, 760, 809, 811; (Subcat. 50-a. MULBERRY BOX) 512.

Exhibits.—29 (l. and s. panel, l. block); 118 (l. and s. panel, l. block); 128 (l. panel, l. block); 376 (s. panel, l. block); 378 (l. block).

(51) OLIVE LAURELS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
395. Beilschmiedia fagifolia.	42	615	1	1	1	4	II	Agt., WGT., KAN.-TVY. Anms., scat.
396. Beilschmiedia Wightii.								
397. Beilschmiedia Bourdilloni.	51	...	3	1	1	4	III	TRV., Svys., scat.
403. Phoebe lanceolata.	51	...	4	1	1	4	III	MBR.-TVY., Anms., scat.
405. Alseodaphne semecarpifolia.	55	...	3	1	1	2	II	NCCS., KAN.-TVY., MPLT.
406. Aetinodaphne campanulata.	54	907	4	1	1	3	III	TVY.
407. Actinodaphne lanata.								NLGS., Wnd.
408. Actinodaphne madraspatana								CDP., NAC., WGTS., esp. NLGS.
409. Actinodaphne Hookeri.								NCCS., KAN.-TRV.
413. Litsaea coriacea.	...	...	4	1	1	3	III	TVY., TRV.
415. Litesaea Wightiana	46	...	4	1	1	3	III	KAN.-TRV., NLGS.
oleoides.	...	...	...	...	...	...	...	NLGS.

Uses.—Beddome is the only authority who gives any information about these timbers and their uses, and only in the following instances:—

(It must be remarked that Sir D. Brandis in his "Indian Trees" says, "From a forest point of view the order LAURACEAE deserves more attention than it has hitherto received.")

395. (Said to be good), building. 396 (this and all the timbers of this family deserve the attention of Forest Officers), no uses. 405 (said not to warp and resist the action of teredo), building, boat-construction. 406 to 409 (probably of good quality), no uses. 415 (satiny in appearance), rafters.

"Beilschmiedia: (sapwood pale golden yellow rather sharply marked off from heartwood which is from a shade darker than sapwood to a light golden brown

darkening somewhat with age, grain slightly crossed in narrow bands, texture fine glossy dense, aromatic when fresh, seasons well, easy to work, durability I, even sapwood rarely attacked by insects), poles, ties, bridge-wharf- and ship-building, posts, sills, beams, joists, rafters, floors, window-sills, doors, ceiling and sheathing, siding, oars and paddles, carving, household implements (Schneider). All the above seem to work into a single category, as defined under Beilschmiedia.

European timbers quoted.—The structure and colouring resemble that of the Olive (F.W. 64), but the weight of these is much less; they could however take the place of Olive for carving.

Vernaculars.—395, 396 (K) = Kamate. 397 (M) = Muralkutti. 403 (no names known). 405 (Tl) = Naramāmidi; (Ta) = Kanaippirandai, Pudai; (M) = Vāttu; (K) = Karuvadi, Neralutare. 406 to 409 (U) = Jādāmbo; (Tl) = Kovangutti; (Ta) = Puttudāli, Tāli; (M) = Puttampilāvila, I'Yōli, Munkāli, Malavirinni, Neyārum, Pūvaca; (K) = Nitte. 413 (Ta) = Panrittāli; (M) = Maravettittāli. 415 (K) = Kanci.

Under 1 *foot diameter of the same category.*—674, 689 (bis), 742, 745 (Subcat. 51-a.—SANDAL), 776.

NOTE.—123. Lansium anamallayanum nearly comes into this subcategory (see Cat. 55), but the colour is not quite deep enough, nor the aromatic oil sufficient.

Exhibits.—406 (s. panel, l. block).

(52) STRIPED EBONIES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
337. Diospyros oocarpa (M).	45	...	5	2	1	4	III	WGTS., KAN.-TRV.
339. Diospyros insignis.	...	...	4	2	1	4	III	TRV., CBT. (Anms.).
344. Diospyros Bourdilloni (VH).	54	785	3	2	1	3	III	WGTS., MBR.-TVY. Anms.

Uses.—No details regarding quality nor uses are reported with the exception of 337 [which Gamble says is like Calamander (Zebra) wood and can be used like it

for] cabinet-making ; the same applies to the other two, in all cases when the streakings are well developed, otherwise each of them comes into category 35. White Ebonies, which see for Schneider's description of the Ebonies generally.

European timbers quoted.—There are no European representatives like Calamander Wood, but, as before said, the White Ebonies have the structure of Pear (F.W. 41).

Vernaculars.—337 (Ta) = Vellaikkarungāli. 339 (Ta) = Pottuttuvarai. 344 (Ta) = Karuncattiyam, Karunduvarai ; (M) = Kari, Kotal, Terika.

Under 1 *foot diameter of the same category.*—(None).

Exhibits.—(None).

D.—White or lightly yellow-tinted.

(53) False Hornbeams—

	W.	P.	S.	D	U.	A.	VC.	Localities.
(i) Without heartwood—								
23. Capparis grandis.	48	...	5	3	3	3	IV	DKN., CNTC., dtts.
102. Toddalia biloculаris (?).	...	...	3	3	3	4	IV	WGTS., CAN.-TVY., Anms., scat.
103. Feronia elephantum.	50	634	4	3	2	3	III	Most dist. scat.
104. Ægle marmelos.	56	...	4	3	2	3	III	Most dist. dtts. scat.
300. Randia Gardneri.	55	...	4	3	3	4	IV	TVY., TRV.
364. Strychnos nux-vomica.	65	813	2	3	2	2	II	Most dist.
365. Strychnos potatorum.	58	840	4	3	2	3	III	Most dist. dtts.
(ii) With very small heartwood in old trees—								
203. Tamarindus indica.	75	773	1	2	2	2	II	Most dist. esp. dtts. DKN.
214. Prosopis spicigera.	59	...	4	3	2	2	III	Most dist. dtts. bctn.
	?	?						
	72	901						

Uses.—23 (durable), small buildings, agricultural implements (Bed. Gbl.). 102, 300 (very little known of these two timbers, but from their congeners likely to be tough—the characteristic of the category—, not used).

103 (strong, close- even- and fine- grained, durable, but sapwood often eaten by beetles.—Bed. Bs.), house-building, naves of wheels, oil-crushers, agricultural implements, well adapted for ornamental carving (Bs. Gbl.). 104 (compact, esteemed for strength and toughness, even and close grained—(Bed. Bs.), construction, naves and other parts of carts, oil- and sugar- mill pestles, agricultural implements, drums (Bed. Bs. Gbl.). 364, 365 (close-grained, durable, bitter not attacked by white-ants, takes good polish—Bed. & Bs. Gbl. Kurz.), building, plough shares, cart-wheels, costs, fancy cabinet-work (Bed. Gbl. Kurz.). ii—203 (sapwood not clearly defined, the dark so-called heart very hard dark purplish projecting into the hard-yellow wood with radiating ramifications, the outermost wood softer and apt to be eaten by insects unless water-seasoned not durable, central portion durable, heart very durable, difficult to work but polishes well, (Bed. Bs. Gbl.), naves and other parts of wheels, oil-presses, sugar-cane crushers, rice-pestles, mallets (including croquet mallet-heads and balls), planes, tent-pegs, furniture, excellent for turning (Bed. Bs. Gbl. Kurz.). 214 (there is a divergence of opinions about the qualities of this : " straight and close grained, hard and durable, superior to teak in strength, weighs about 100 lb. unseasoned and 72 seasoned,"—Bed. ; " Skinner gives weight 72 lb., and P=981, but the identification of his specimens is doubtful, tough, easy to work, but not durable, liable to dry-rot and to be attacked by insects, weight 57-59 lb.,"—Bs. Gbl.), buildings, cart-wheels, agricultural implements, well-curbs (good), and occasionally for furniture (Bed. Bs. Gbl.).

European Timbers quoted.—The colouring, toughness and, of the first class without heartwood exactly, the weight of these timbers correspond with those of the Hornbeam (F.W. 54); the greater weight of the second

lot is no objection but the reverse, for it is because of its weight compared with other European woods that gives Hornbeam one of its qualifications.

Vernaculars.—23 (Tl) = Rēgutti, Dudduppi, Nālluppi, Gudi, A'ridonda; (Ta) = Turattu, Nākkulincan, Vellaitturattu; (K) = Totle, Tottulla, Rēvapi. 102 (no names known). 103 (U) = Koit'ho; (Tl) = Velaga, Kapitt'hamu; (Ta) = Vilā, Vellilōttiram; (M) = Vilannu, Vilāvu; (K) Bēla, Belala. 104 (U) = Belo; (Tl) = Mārēdu, Māredu, Bilvamu; = (Ta) Villuvam, Kūvilam, Māvilangai; (M) = Vilvam, Kūvilam, Māvilāvu; (K) = Bilva, Bilvaptre, Kumbala, Bellapatre. 300 (Ta) = Padārappan. 364 (U) = Korā; (Tl) = Musidi, Mushti; (Ta) = Etti, Kānciram; (M) = Kānniram; (K) = Kāsara Kasāraka, Itti, Kānjira, Hemmushti, Kāyeru. 365 (U) = Kotoko; (Tl) = Cilla, Induga, Indupu; (Ta) = Tērrā, Terrāngottai; (M) = Tērrā, Tērrāmparalkānniram; (K) = Cilla, Kataka, Anduga, Calibīja. ii -203 (U) = Koina, Centuli; (Tl) = Cinta; (Ta) = Puli; (M) = Puli; (K) Hunise, Punke. 214 (U) = K'hodiro, Somi; (Tl) = Jammi; (Ta) = Parambai, Vanni, Cami; (M) = Parampu, Vanni; (K) = Banni.

Under 1 *foot diameter of the same category*:—499, 501, 509, 514, 527, 629, 641, 642, 759, 782, 783.

Exhibits.—103 (s. panel, l. block). 104 (l. panel). 364 (s. panel, l. block). 365 (l. panel, l. block). ii—203 (s. panel, l. and s. block). 214 (s. panel, l. block).

(54) FALSE WHITE SERVICE—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
152. Hemigyrosa deficiens.	53	428	4	3	1	3	III	CHN.-TVY., Anms.
153. Hemigyrosa canescens.	54	...	4	3	1	3	III	Most dist, degn. scat.
302. Gardenia latifolia.	51	...	5	2	2	2	III	
307. Canthium didymum. } 308. Canthium bellatum. }	53	...	4	2	2	2	III	Most dist. degn. NEL.-TCH., MPLT., WGTS.

	W.	P.	S.	D.	U.	A.	VC.	Localities.
309. Canthium neilgherrense. 310. Canthium ficiforme.	58	.	4	2	2	2	III	WGTS., NLGS., Pnis. MPLT., TVY.
311. Canthium travancoricum.	...	...	4	2	2	4	III	TVY., TRV.
425. Hemicyclia venusta.	51	726	4	4	1	3	III	TVY., TRV.
433. Croton malabaricum.	...	...	4	3	1	3	III	WGTS. esp., MBR.-TRV.

Uses.—152 (cross-grained, not used—Bdn.). 153 (close-grained, Gbl.), small building, (Bed. Gbl. X.) 302 (close and fine grained, durable, easy to work, recommended as substitute for Box (Bs. Gbl.); engraving, turning, combs (Bs. Gbl.). 307 to 310 (close and even grained, somewhat resembles box and called Ceylon Boxwood—Bed.), agricultural implements (Bed. Gbl.). 311 (no qualities nor uses recorded). 425 (close grained, cracks a good deal, not durable—Gbl. Bdn.); house-posts, walking-sticks (Gbl. Bd.). 433 (close and even grained, seasons well—Gbl.); no uses recorded. X—"(flexible and tough, bends well when steamed, grain somewhat crossed, texture fine smooth, seasons well, fairly easy to work, durability III, sapwood often attacked by beetles), posts above stumps, beams, joists, rafters, flooring, sheathing, ceiling, interior finish, boat-building-masts and spars, ax pick rake and hoe handles, levers capstan--bars and peavies, minor tool handles, furniture and cabinet work, recommended for tight cooperage and gymnastic apparatus" (Schneider).

European timbers quoted.—By some of the authorities above some of these have been recommended as substitutes for Boxwood (F.W. 65), but they seem to fit more closely to White Service (itself often used as a Boxwood substitute), which is not so heavy nor quite so small pored (F.W. 33.)

Vernaculars.—152 (Ta) = Pūvam, Kāttuppūvam. 153 (U) = G'hontiākusumo, Pānikusumo; (Tl) = Ekkudubusi

Boddamāmidi, Murumāmidi, Korivi; (Ta) = Karadippungu, Neykkottān, Tolukkottān, Puvandi, Vekutā; (U) = Kadupe, Kalluhatte. 302 (U) = Bodogurudu, Dāntiā, Kurukutu, Kōtorāngo; (Tl) = Bikki, Adavibikki, Kondabikki, Peddabikki, Kokkita, Kondakokkita, Rātikokkita, Kāringuva, Peddakāringuva; (Ta) = Kambil, Perungambil; (K) = Bikke, Adivibikke, Kalkambi. 307 to 310 (U) = Dālosingi, Gujorāni, Pryt' hugujorāni, Kori, Tōlā; (Tl) = Balasu, Nallabalasu, Nakkena, Nīralli; (Ta) = Imburuttan, Nakkanai, Nallamandanam, Nalluvugai; (M) = Nallamandanam, Nānnūl; (K) = Ellele, oppe, Oppele, Gandekakkōrla. 311 (no names known). 425 (Ta) = Pattakkanni, Vellalambu; (M) = Vellakkatavu, Vellakkāri; (K) = Mūlahannu. 433 (Ta) = Tavattappolavu; (M) = Koluvāsi, Pamparam, Tēnātal, A'nak-Kuru.

Under 1 *foot diameter of the same category.*—526, 530, 534, 540, 543, 544, 551, 573, 574, 575, 576, 577, 630, 631, 686, 690, 699, 701, 702, 703, 704, 705, 706, 712, 715, 735, 738, 774, 793, 795, 796, 797, 800, 801.

Exhibits.—307 (s. block).

(55) FALSE BOX—

(i) *Hard.*—	W.	P.	S.	D.	U.	A.	VC.	Localities.
248. Eugenia laetas ...	58	...	4	2	3	4	IV	WGTS., KAN.-TVY.
268. Eugenia bracteata (var. Roxburghii.)	..	...	5	2	3	4	IV	TRV., Anms.
268. (bis) Eugenia Mooniana.	...	..	4	2	3	3	III	KAN., TVY., NLGS., Anms.
301. Randia Candolleana.	60	...	5	2	3	3	IV	DKN., MPLT., CNTC.
303. Gardenia turgida.	56	...	4	2	3	2	III	Most dist. dtts.
304. Diplospora apiocarpa.	...	..	4	2	3	4	IV	MBR., TRV., NLGS., Anms.
305. Diplospara sphaerocarpa.	...	...	...	...	..	...	...	TVY.
426. Hemicyclia elata.		...	.	...	..	...	...	MBR., TRV., Anms.
Hemicyclia Wightii.	57	...	3	2	3	3	III	NLGS.
Hemicyclia travancorica.	...	...	...	..		...	...	TRV.

	W.	P.	S.	D.	U.	A.	VC.	Localities.
(ii) *Very hard*—								
123. Lansium anamallayanum.	62	1041	4	2	1	3	III	MBR.-TVY., NLGS., Anms.
134. Chloroxylon swietenia.	58	845	3	1	1	2	II	Most dist. dtts.
142. Euonymus indicus.	..	...	4	2	3	4	III	Agt., CRC., KAN., NLGS.
143. Euonymus dichotomus.	..	...	4	2	3	4	III	WFS.-tesp., TRV-Anms.
272. Memecylon edule and other species.	58	...	4	2	3	2	III	Most dist. degn. rvrs. and shos.
354. Linociera malabarica.	65	...	4	2	3	3	III	NEL., CDP., CPT., KAN.-TRV.

Uses.—i 248 (wood brownish-grey, close-grained, rather coarse, not used,—Bdn.). 268 (wood grey, close-grained, not used—Gbl. Bdn.). 268 (bis), (wood yellow, becoming black by burying in mud, close-grained, durable—Bdn.), walking-sticks, (Bdn.). 301 (wood light brown, even close-grained and has the character of Boxwood, no uses—Gbl.). 303 (wood white with a purplish tinge, close-grained and even closer in the drier tracts, a good wood unused but has the character of Boxwood and deserves attention as a possible substitute for the cheaper rougher work of engraving, tool-handles, etc., splits and cracks in seasoning—Bs. Gbl.). 304, 305 (wood white, close-grained, rough, no uses—Bdn.). 426 (wood creamy-white, strong, close-grained with the texture of Boxwood—Gbl.), building (Gbl.). ii-123 (wood pale yellowish-white scented, somewhat of Sandal, smooth straight and even grained excellent wood but, small in size, no uses—Bdn.; seems to be intermediate between Sandāl and Satinwood, and should answer all the purposes of the latter, A.W.L.). 434 (Yellow-tawny, A.W.L.—often mottled and featered, with satiny lustre, close-grained and resembles Boxwood, very durable and stands well under water, liable to warp and split if not seasoned in shade, polishes beautifully—Bed. Bs. Gbl.), excellent for cabinet and ornamental work but not

suitable for engraving, furniture, backs of brushes, picture-frames, ploughs, axle-trees, oil-presses, gun-carriage work (Bed. Bs. Gbl.). 142, 143 (wood white compact, close and even grained, substitute for Boxwood—Bed. Gbl.), wood-engraving (Bed. Gbl.). 272 (wood brownish, close-grained, substitue for Boxwood—Bed. Gbl.), house-posts. (Bed. Gbl.). 354 (wood creamy or yellowish-white with satiny lustre, close-grained and very like Boxwood, not used—bl.).

European Timbers quoted.—As will be seen from the above, these woods all resemble Boxwood (F.C. 65) but they are not quite so heavy, nor are any of them quite, such a perfect wood for the purposes for which Box is used.

Vernaculars.—248 (M)= Kāttuccampakam ; K) = Maddale. 268 (U) = Mod'hurojotti, Sogoropotonā ; (Tl) = Aramanda, Gārimottu, Gorgumudi, Kuntinērēdu, Rodda ; (Ta) = Vengalaikkāvā, Kāyā, Pīkkonci. 268 (bis) (no names known). 301 (Tl) o = Kudamanga, Peddamanga ; (Ta) = Malaikkārai ; (K) = Mahāgāre, Malakua. 303 (U) = Bomoniā, Dārobokryco, Gūrnnā ; (Tl) = Kokkita, Mullukokkita, Tellakokkita, Tuddumanga ; Verribikki ; (Ta) = Malangārai, Nancundam ; (M) = Malankāra ; (K) = Magge, Bongeri. 304, 305 (M) = Kāttuppancāru. 426 (Tl) = Bīra ; (M) Bālā ; (K) = Sampuhannu, Ahilapu. (ii) 123 (Ta) = Candanavirai, Tēvatāli ; (M) = Cerubayināvu, Vantakkanni, Tēvatāli. 134 (U) = B'heru; (Tl) = Billu, Billudu ; (Ta) = Karumboradcu, Kudavuboradcu, Poradcu, Van, Mudirai, Vicaram ; (K) = Bittulla, Hurihuli Masula. 142 (Tl) = Nallakākidi. 143 (Ta) Malaikkurattai ; Vīnī. 272 (U) = Nīroso, Bonohorono ; (Tl) = Alli, Kukkalli, Uddatalli ; (Ta) = Kācā, Kāyā, Perungācā, Cirugācā ; (M) = Kālcavu, Kanila, Pūvandetti, Pūvanciti, A'rrukkanila ; (K) Ollekodi, Gandukēpala, U'didalle, Alle, Neymāru. 354 (Tl) = Pūnagamu, Pūnicce ; (Ta) = Parumbalu,

Kalidalai ; (M) = Kāttetala, Kaletala ; (K) = Hariyage, Mahōdale, Māyisale.

Under 1 *foot diameter of the same category.*—535, 542, 546, 550, 593, 787, 807, 808.

Exhibits.—268 (bis). (s. panel, s. block, square, roller, lath). 123 (s. panel, s. block, square, roller, lath). 134 (l. and s. panel, l. and s. block). 272 (s. panel). 354 (s. panel, s. block).

E.—*Black Heartwood.*

(56) BLACK EBONIES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
324. Maba buxifolia 325. Maba nigrescens.	58	...	5	1	1	2	11	Most dist. degn. DKN., MPLT., WGTS., rvrs.
332. Diaspyros ebenum. 333. Diospyros assimilis. (VH)	70	940	2	1	1	3	11	NEL., CPT., CNTC., WGTS.
338. Diospyros tomentosa. Diospyros melanoxylon.	63	1021	3	1	1	2	11	WGTS., KAN., TRV. Most dist., dtts.

Uses.—324, 325 (sapwood greyish-white, heartwood jet black or streaked with grey, hard dense brittle, close-grained, durable I (Gbl. Bdn. Schneider), not used (Gbl. Bdn.). 332, 335 (considered by many as identical, sapwood grey often streaked with black, or reddish (A.W.L.), heartwood jet black, very hard, close and even grained, stands high polish (Bed. Gbl.), sapwood for building and other purposes (Bed.), heartwood for turnery, cabinet-work, keys of pianos, rulers, backs of brushes, chopsticks in China, pipes, carved stands, for vases and images (Gbl.). 338 (these two again considered identical—together with the smaller D. tupru—by many, sapwood reddish or purplish white, heartwood black irregular, hard to very hard (Gbl.), building, carriage shafts, shoulder poles carved walking-sticks, pictureframes, combs, etc. (Gbl.).

When the heartwood is not developed, 324, 325, 332 pass into the White Ebonies (Cat. 35, which see for Schneider's description of all the Ebonies), and 333, 338 into the Red Ebonies (Cat. 42).

European timbers quoted.—There is no European representative of the Black Ebony, when properly developed; the Holly (F.W. 58) and Yew (F.W. 27) are stained black and used as substitutes for Ebony; but when the heatwood is not developed the wood is much like the Pear (F.W. 41).

Vernaculars.—324, 325 (U) = Gourok'hōlī, Pītonu; (Tl) = Chinnavulinji, Erravūti U'ti, Kārūti, Nallamūdi, Pisinika, Nallapisinika, Pittapisinika; (Ta) = Irumbili, Kuruvinci, Kāttuttuvarai, Vīcaram; (K) = Piccane, Simbalike, Karugāne Kari. 332, 333 (Tl) = Nallūti, Nallavāludu; (Ta) Tāli, Karundāli, Karungāli, Narai, Kākkāyttāli, Marā, Māy; (M) = Karu, Mishtumpi, Vayasi; (K) = Bāle, Kari, Mallali. 338 (U) = Kendu; (Tl) Tumiki, Mancitumiki, Nallatumiki, Pasarugāta; (Ta) = Tumbi, Karundumbi, Karai; (M) = Karu; (K) = Bāle, Bilāra, Tupare, Tumare.

Under I *foot diameter of the same category.*—(None.)

Exhibits.—332 (l. & s. panel, l. block). 338 (l. panel, l. & s. block)

IV.—Mostly Very or Extremely Hard.

Reddish or Yellowish (in order by weight).

(57) Maroon Ironwoods—

		W.	P.	S.	D.	U.	A	VC	Localities.
43.	Mesua ferrea ...	70	1010	1	1	1	3	I	WFTS., esp. NLGS.-Anms.
131.	Soymida bebrifuga.	74	825	3	1	1	2	II	Most dist. except WTCT.
188.	Pterocarpus santalinus.	74	975	4	1	1	3	II	KNL., CDP., NAC., CPT.
200.	Hardwickia binata.	76	942	2	1	1	2	I	GDV.-CBT., NLGS., dtts.

Uses.—(All extremely hard.) 43 (wood dark red or reddish-brown, disliked for felling as it turns the axe

edge, also difficult to saw, very strong, very durable and lasts well underground (Bed. Gbl. Kurz. Bdn.), splendid engineering construction timber, bridges, sleepers, house-building, carpentry, machinery, gun-stocks, tool-handles, recommended for paving blocks (Bed. Gbl. Kurz. Bdn.). 131 (wood bright red when fresh to dull dark red-brown with satiny lustre very strong, very durable including under ground under water or in damp masonry walls, apt to crack in seasoning, easily worked and planed (Bed. Gbl. Bs.), construction work (but considered sacred by Hindus used by them for dēvas-tambhams—temple pillars—but not in dwellings), excellent piles and sleepers, good clamps in masonry walls, well-work, beautiful cabinet and furniture wood, piano cases, tables, carving, ploughshares, pestles, oil-pounders (Bed. Bs. Gbl.). 188 (wood orange when freshturning claret-red to almost black, close and even grained, very durable, easy to work, takes fine polish (Bed. Gbl.), building especially house-posts—often carved and ornamented—cabinet work, carving and sculpture, joinery, furniture, boxes, picture-frames (Bed. Gbl.). 200 (wood dark red often tinged with purple and streaked with black, cross- and very close- grained, very strong, very durable, liable to split but does not warp, takes fine polish (Bed. Bs. Gbl.), general construction, bridge- and house- building, especially posts—often carved and ornamental—recommended for sleepers, cabinet-work and furniture, carving and sculpture, ploughshares, pestles, oil- and rice- pounders (Bed. Bs. Gbl.).

European timbers quoted.—No European timbers approach these in weight, colour or durability, and none but the Olive (F.W. 64) and Holm Oak (F.W. 60) in hardness.

Vernaculars.—43 (Ta) = Nāngu, Nāgappu, Nāgēcuram, Curuli; (M) = Vainavu, Nānga, Nāgaccampakam, Curuli; (K) = Nāgakēsara, Nāgasampige, Kēsara, Atta. 131 (U) = Sonhān; (Tl) = Sōmi, Sōmiti; (Ta) = Cūmi, Cōmbu,

Cem, Curakkalli, Vanda; (K) = Svāmi, Kalgarige. 188 (Tl) = Candanamu, Erracandanamu, Raktacandanamu; (Ta) = Candanam, Cencandanam, Civappuccandanam; (K) = Kempugand'ha, Raktacandana. 200 (Tl) = E'pe (commonly Yēpi), Nārēpe; (Ta) = A'ccā, Karāccā; (K) = A'ccā, Kārāci.

Under 1 *foot diameter of the same category.*—656.

Exhibits.—43 (l. & s. panel, l. block). 131 (l. & s. panel, l. & s. block). 188 (s. panel, l. block). 200 (l. & s. panel, l. & s. block).

(58) CUTCH—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
219. Acacia suma ...	70	801	4	1	1	3	II	MPLT., CNTC.
220. Acacia catechu...	76	847	3	1	1	2	II	Most dist. dtts.
221. Acacia ferruginea.	68	789	4	1	1	3	III	Most dist. dtts. scat.

Uses.—(All very hard.) 219 (wood dark brown, durable and not attacked by white-ants, works smoothly and takes good polish (Bed. Gbl.), house-building, construction of carts, ploughs, pestles, drinking-cups (Bed.). 220 (sapwood yellowish white, heartwood light to dark red, fibrous, close grained, extremely durable more so than Teak, not attacked by white-ants nor by teredo, seasons well, takes fine polish (Bs. Gbl. Kurz.), the last, 219, has been much confused with this, and, as far as timber goes, there is little to choose between them), house construction especially posts and pillars, bridges, railway sleepers, oil- and sugar- crushers and rice-pounders, agricultural implements especially ploughs, wheelwrights' work, bows, spear- and sword- handles, cotton rollers (Bs. Gbl. Kurz.). 221 (sapwood yellowish white, heartwood olive- to reddish- brown, very durable and generally closely resembling the last, 220 (Bs. Gbl.), building, carts, agricultural implements (Gbl.).

European timbers quoted.—The actual colouring, weight and structure resembles that of the Evergreen Buckthorn, but, whereas these are very strong and very

durable, the Evergreen Buckthorn (F.W. 50) is brittle and is only used under cover.

Vernaculars.—219 (U) = Somī, Somīguāriā; Guāriā; (Tl) = Tellacandra; (Ta) = Cēlai, Cilai, Cēlaiyancai, Cilaiyuncai; (M) = Venkarinnāli; (K) = Bilijāli, Cēlaiyudi, Sami. 220 (U) = K'hoiro, K'hodiro; (Tl) = Candra, Nallacandra; (Ta) = Karungāli, Cengarungāli, Kadiram; (M) = Karinnāli, Cenkarinnāli, Kadiram; (K) = Kaggali, Kempuk'hairapujāli, Saradu, Tera, K'hadira. 221 (U) = K'hoiro, K'hodiro; (Tl) = Vannacandra, Vellicandra; (Ta) = Vanni, Pēykkarungāli, Cimaivelvel; (M) = Vanni; (K) = Banni.

Under 1 *foot diameter of the same category.*—659.

Exhibits.—219 (l. panel). 220 (l. panel, s. block). 221 (l. panel).

(59) HEAVY SABODILLAS (AND MANGROVES)—

	W.	P.	S	D.	U.	A.	VC.	Localities.
(i) *Sapodillas*—								
318. Bassia latifolia.	62	687	2	1	1	2	I	NCCS., DKN., MPLT., CNTC., dtts.
321. Mimusops elengi.	62	632	3	1	1	3	II	Most dist., rvrs., scat.
322. Mimusops Roxburgiana.	62	854	3	1	1	3	II	NLGS., Anms. and most dist. scat.
323. Mimusops hexandra.	67	998	4	1	1	2	II	NCCS.-MPLT., degn.
(ii) *Mangroves*—								
72. Heritiera littoralis	65	903	4	1	1	3	II	CNTC., WTCT., litl., sswp.
73. Heritiera papillio.	57	...	3	1	1	3	II	MBR.-TVY., shos.

Uses.—318 (strong, close- and even- grained, tough, durable but white-ants attack sapwood, seasons well, not easily worked,—Bed. Bs. Gbl.), not much used being chiefly kept for spirit from the flowers,—building, door-panelling and framing, country boats, sleepers, furniture, naves of wheels (Bed. Bs. Gbl. ½). 321 (strong, close- and even- grained, durable, of good colour and quality takes beautiful polish (Bed. Bs. Gbl. Kurz.), house-

building, cabinet-work, carts especially shafts, rice-pounders, furniture (Bed. Bs. Gbl. Kurz.). 322 (strong, rather coarse-grained, durable, easily worked,—Gbl.), house-building, gun-stocks (Gbl.). 323 (strong, tough, close- and even- grained, very durable especially under salt water,--piles found sound after 100 and 135 years in two cases,--Bs. Gbl.), house-building especially posts and decorative fittings, oil-presses, sugar-mills, furniture, excellent for turning, tool-handles, etc. (Bs. Gbl.); "Bassia, Mimusops: (321 similar to 318 but all elements finer and take glossier surface under sharp tools, grain slightly crossed, dense glossy in 321 not in 318, seasons well in boards but liable to split internally in large timbers, hard to saw but not otherwise difficult to work, durability I, heartwood rarely attacked even by termites and very slowly by teredo, even sapwood not rapidly attacked by fungi), warf, bridge and ship-building, posts foundation sills, 321 especially a favourite for ships' wheels, marline-spikes, and fine turned and shaped-tool handles, ties, paving-blocks (Schneider). ii. 72, 73 (wood identical in structure except pores less numerous and smaller in latter, very hard, close-grained, strong, tough, and durable,—Gbl. Kurz.), grain crossed sometimes curly, texture fine, dense, smooth but not glossy, logs and large timbers liable to split deeply in seasoning, boards less liable to split, but must be rapidly piled and heavily loaded to prevent warping, very difficult to work both on account of its hardness and toughness and because it dulls tools badly, durability I, heartwood rarely attacked even by termites and only very slowly by teredo, sapwood rapidly attacked by both insects and fungi (Schneider), building, house-posts, rafters, etc., bridge-piles, boats, cart-poles, agricultural implements (Gbl. Kurz.), piling, posts, foundation-sills, ties, paving-blocks, bridge, warf and ship-building, beams, joists, rafters, hubs, spokes felloes and axles,

capstan bars and other levers, axe, pick and other tool-handles, mallets and other wooden tools, recommended for steamed bent-wood where strength and durability are required (Schneider).

European timbers quoted.—There are no European representatives of this category of timbers.

Vernaculars.—318 (U) = Mohulo; (Tl) = Ippa; (Ta) = Iluppai, Kāttiluppai; (M) = Irippa, Kāttirippa, Pū Pūvuma; (K) = Ippe, Doddippe, Hālippe. 321 (U) = Bokulo, Boulo, K'hyiri; (Tl) = Pogada, Vakulamu, Nemmi, Nunni; (Ta) = Magil, Ilanci, Vagulam; (M) Ilanni, Bakulam; (K) = Renje, Pagada. 322, 323 (U) = K'hyiri, Rājono; (Tl) = Pāla, Mancipāla, Nemmi, Munni; (Ta) = Kanuppālai, Karumbālai, Pālai, Ulakkaippālai, Cukkilam; (M) = Pāla; (K) = Renje, Kalhāl, Bakula. 72. (Tl) = Adavibādamu; (Ta) = Conmundiri, Kannādiyilai; (M) = Mukuram, Nākam. 73 (Ta) = Caundarigai, Cavandalaiyunnu, Cōlaivendēkku.

Under 1 *foot diameter of the same category.*—667, 678.

Exhibits.—318 (l. panel, s. block). 321. (s. panel, l. block). 323 (l. & s. panel, l. & s. block). 73 (l. panel).

(60) False Olives—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
236. Terminalia chebula.	61	968	4	3	1	3	III	Most dist. scat.
239. Terminalia pallida.	...	...	4	3	1	4	III	CDP., NEL., CPT., scat.
241. Anogeissus latifolia.	62	877	3	2	1	2	II	Most dist. dtts.

Uses.—236, 239 (until quite recently these two have been considered identical; strong but variable, P = 810 to 1230, fairly durable, but uncertain—sometimes lasting excellently, other times developing dry-rot,—close, but cross-grained, difficult to work, but takes a fine polish,—

Bed. Bs. Gbl. Kurz.), house-building, beams, rafters, railway sleepers (uncertain), ship and boat-building, furniture and cabinet work (excellent), carts and agricultural implements, not much felled, being kept for Myrobalans (Bed. Bs. Gbl. Kurz.). 241 (very strong but variable;— P = 752 to 1220—very tough and very superior for sustaining cross strain and in direct cohesive strength, sapwood not durable otherwise very durable if properly seasoned but it decays rapidly if left exposed in the forest to the weather when it is soon attacked by insects and white-ants, warps and splits in seasoning,— Bed. Bs. Gbl.), house-building, ship-building, cart-building (one of the best for poles and axles, sleepers (moderate only), furniture (good), poles for carrying loads (excellent), axe and tool-handles (good), agricultural implements (Bed. Bs. Gbl.).

European timbers quoted.—This category partakes very much of the character of the Olive (F. W. 64) in hardness, weight, colouring and power of utilization. Uncertain in durability for construction, for cabinet work and furniture the above description shows them to be excellent, and these including also inlaying sculpture and fancy ware, are the uses of the Olive.

Vernaculars.—236 (U) = Horidá; (Tl) = Karaka, Nallakaraka; (Ta) = Kadukkāy; (M) = Katukkā; (K) = Arala, Harada. 239 (Tl) = Tellakaraka, Velamakaraka; (Ta) = Vellaikkadukkāy. 241 (U) = D'hoū; (Tl) = Cirimānu, Sirikana, Velama; (Ta) = Vellaināgai, Vekkāli, Namai, Vellainamai; (M) = Vellanāvu, Malakkānniram, Marukkānniram; (K) = Bejjalu, Dindalu, Dindiga, Tirapu.

Under 1 *foot diameter of the same category.*—500, 610.

Exhibits.—236 (s. panel, l. block). 241 (l. panel, l. & s. block). 610 (s. panel, s. block, square roller, lath).

(61) SERVICE MAHOGANIES—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
113. Filicium decipiens.	60	902	2	1	1	2	I	MBR.-TVY., NLGS., Anms.
120. Aglaia Roxburghiana.	59	896	2	2	1	3	II	Agt., KAN.-TVY., MYS.
121. Aglaia Maiae (H).	57	1061	4	2	1	4	III	TVY., TRV.
122. Aglaia minutiflora Aglaia travancorica.	...	...	4	2	1	4	III	TVY., TRV., Anms.
127. Walsura piscidia (H).	60	947	3	2	1	4	III	MBR., TVY., scat.
196. Cynometra ramiflora.	56	783	3	2	1	4	III	WTCT., KAN., MBR., litl., sswp.
197. Cynometra travancorica.	...	...	3	2	1	4	III	TVY., TRV.
198. Cynometra Beddomei.	...	...	4	2	1	4	III	KAN., MBR.
199. Cynometra Bourdilloni.	...	...	4	2	1	4	III	MBR., TRV., NLGS., ANMS., scat.

Uses.—113 (wood red, extremely hard, close-grained with long fibre, smooth, often knotted, an excellent wood but little known,—Bed. Gbl. Bdn.), valuable for building (Gbl. Bed.), cabinet-work, furniture and carving in Tinnevelly (A.W.L.). 120 (wood bright red, very strong, very hard, close-grained, smooth with long fibre, fissile (Bed. Gbl. Bdn.), building (excellent, spokes and felloes of wheels, axe-handles (Bed. Gbl. Bdn.). 121 (wood dark red, not used). 122 (wood red-pink, fragrant, not used); "Aglaia (wood hard to very hard, pale red to deep coppery red, grain generally crossed, often distinctly wavy, texture fine, dense, taking a very smooth-surface under sharp tools, seasons well, rather difficult to work the curly wavy grain requiring a very sharp fine-set plane to surface it well, often with a clear resin exuding from fresh specimens, durability at least II, heartwood rarely ever attacked by termites, nor even the sapwood by beetles), posts and ties, bridge and wharf-building, beams, joists, rafters, flooring, sheathing and ceiling, fine

furniture and cabinet-work, would make beatifully strong, probably entirely moth-proof, chests," (Schneider). 127 (wood dark red to dark brown much streaked with black, sapwood reddish-brown, very hard, fine and close-grained, no uses, Gbl. Bdn., considered good by the natives and used for various purposes,—Bed., practically similar to the last, and probably could be used in the same ways, A.W.L.). 196 (wood red very strong, close-grained, very durable, cracks and splits when exposed,—Bed. Gbl. Bdn.), house-building especially posts, cart-building, (Bed. Gbl. Bdn.). 197 to 199 (no qualities and no uses recorded).

European timbers quoted.—This category seems to combine the characteristics of the Mahogany (F.W. 42, bis) with those of the Service Tree (F.W. 63); the colouring and qualities furnishing a high class construction wood belonging to the Mahogany are present here, but the weight and transverse strength are very much greater in these; the weight and the toughness of the Service tree are also present here, and the structure, as far as the rays and pores are concerned, is exactly intermediate between the Service and the Mahogany.

Vernaculars.—113 (Ta) = A'rralancal, Attaidāli, Kāttuppūvaracu, Nīngal, Nīrkkāngu ; (M) = Irumbāga, Nīrōli, Nīrvāli, Vālmuriccal. 120 (U) = Priyongo; (Tl) = Erranduga-Kondanduga; (Ta) = Cokkalai, Kannikkombu; (M) = Bāyināvu, Punyāvu, Cempuli; (K) = Tottilakāyi. 121 (Ta) = Kāragil. 122 (M) = Nīrmuli. 127 (Tl) = Erravāludu, Vallarasi, Vālarasi, Vālavadisi; (Ta) = Cattuvakku, Malaivirāli, Vālacura ; (M) = Pēril-lāppiccu. 196 (Ta) = Irudbū, Nāyppudukkan ; (M) = Irippa; (K) = Kanaga. 197 (Ta) = Mukkānci. 198, 199 (no names known).

Under 1 *foot diameter of the same category.*—(None.)

Exhibits.—113 (s. panel, l. block). 20 (l. & s. panel, l. & s. block). 197 (s. panel, l. block).

(62) FALSE LABURNUMO—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
192. Cassia fistula ...	61	827	4	2	2	2	III	Most dist.
193. Cassia marginata.	61	798	4	2	2	3	III	SAC.-TVY.
194. Cassia siamea.	53	840	4	2	2	2	III	MRA., TVY. much planted.
195. Cassia timoriensis.	57	594	5	2	2	4	IV	WFTS., Gesp. NLGSG., scat.
273. Lagerstroemia parviflora.	52	612	3	3	1	2	II	Most dist. except FTCT.

Uses.—192 (wood brick-red to red-brown, finely mottled, seldom large, heartwood but copious sapwood, very strong, tough, rather coarsely fibrous, close-grained, elastic, very durable, but if not seasoned liable to be attacked by insects, apt to crack, works easily but somewhat brittle and apt to splinter, takes fine polish (Bs. Gbl. Kurz.), house building especially posts, boat-spars, cart-axles, agricultural implements especially ploughs, bed-plates for machinery, rice-pounders, bows (Bs. Gbl. Kurz.). 193 (wood deep rose-pink when fresh turning reddish brown, very hard, close-grained, durable, works easily and takes good polish (Bed. Gbl:), well adapted for turnery, naves of wheels, handles of instruments (Bed. Gbl.). 194 (indigenously found only in two or three districts, but it has been so much planted and run wild that it is common in many districts, wood yellowish brown with beautiful black mottlings, close-grained, not stiff, durable, works easily with smooth surface and takes a fine polish (Bed. Gbl.) furniture, inlaying, mallets, tool handles, walking sticks (Bed. Gbl.). 195 (Wood identical with the last in colouring and structure,—Gbl. Kurz.), building, furniture (Gbl. Kurz.); " Cassia: (grain usually distinctly crossed, texture rather coarse but dense, and taking a smooth surface under a sharp tool, seasons well, fairly easy to work, durability II, very rarely attacked by beetles but sapwood perishable, posts, ties, beams, joists, rafters, flooring, interior finish, dug-out canoes,

furniture and cabinet-work (Schneider). 273 (wood yellowish-, greyish- or reddish- brown darker towards centre, mottled, elastic, tough, of great strength, straight-fibred, fairly durable, seasons well, works freely, takes good polish—Bed. Bs. Gbl. Kurz.), building posts, beams, rafters, door and window frames, boat-building, cart and carriage shafts, railway sleepers, ploughs and agricultural implements, other tool handles (Bed. Bs. Gbl. Kurz.).

European timbers quoted.—Rather heavier in weight these timbers are nearly the counterpart of the Laburnam (F.W. 48) in colour, structure, elasticity and toughness.

Vernaculars.—192 (U) = Sunāri; (Tl) = Rēla; (Ta) = Konrai, Carakkonrai; (M) = Konna; (K) = Kakke, Konde. 193 (Tl) = Sīmarēla; (Ta) = Cengonrai, Cīmaikkonrai, Civappukkonrai; Kāttukkonrai; (M) = Kattukkonna. 194 (U) = Sīmakāsundiri; (Tl) = Sīmatangēdu; (Ta) = Cīmaiyāvirai, Karungonrai, Konrai, Mancadgonrai, Pirambukkonrai; (M) = Mannakkonna; (K) = Hiretangedi, Sīmatangedi. 195 (no names known). 273 (U) Sid'hā; (Tl) = Cennangit, Cinnangi; (Ta) = Cinnanci, Kaccaikkattai, Pēykkadukkāy; (K) = Cannangi, Cīmangi.

Under 1 *foot diameter of the same category*:—650, 651.

Exhibits.—192 (l. and k. panel, l block). 193 (s. panel, l block). 194 (s. block). 273 (l. and k. panel).

(63) KINOS—

	W	P.	S.	D.	U	A.	YC.	Localities.
189. Pterocarpus marsupium.	51	718	2	2	1	2	II	Most dist: better forests.
212. Xylia dolabriformis.	59	952	1	2	1	2	I	GDV., SAC., SLM. CRG.-TVY., Anms.

Uses.—189 (wood yellowish, reddish, or nut-brown with darker streaks, very hard, close-grained, strong, durable weathers very well but attacked by teredo, seasons well, not very easily worked but takes a fine polish, gives out a yellow stain when damp—Bed. Bs.

Gbl.), building as highly prized as teak, not used in Hindu houses in parts of Madras but especially in demand for temples and choultries,—posts, beams, planking, door and window frames and panelling, one of the best for venetians and weather boards, excellent furniture and cabinet-work—except where yellow staining likely to be objectionable, boat-building, cart-building especially spokes and felloes, temple-cars, railway sleepers, cotton-gins and agricultural implements (Bed. Bs. Gbl.); " Pterocarpus: (grain somewhat crossed frequently very curly or wavy, texture rather fine, seasons well shrinking and checking and warping hardly at all, easy to work, durability II, very rarely attacked even by termites, but sapwood perishable), high-grade interior finish, furniture and cabinet-work and put to every conceivable use in this line, also household implements, tool-handles, saw-frames, try-squares, yard- and meter- sticks, rulers, etc.; dry-measures, musical instruments, carriage and automobile panels, plain and carved jewel- and clothe- chests, canes, scabbards, carved picture-frames, mixed lots of railway ties, single-piece table-tops from buttresses and roots" (Schneider). 212 (wood often twisted knotty or internally cracked, extremely hard, dark-brown, dark-red or dark reddish-brown, strong fibrous and close-grained, as durable as teak and lasts well under ground and under water, but sapwood attacked by white-ants, difficult to cut and liable to crack if exposed, not easy to work, planes with an unctuous surface, and gives out a reddish stain when damp (Bed. Gbl. Kurz. Bdn.), large constructions, piles (excellent), bridge-building especially posts piles and beams, telegraph-posts, railway-sleepers and paving-blocks (excellent), house-building—especially posts, piles, beams, joists, rafters, boat-building especially knees and boat-anchors, cart-building especially naves of wheels, agricultural implements especially ploughs

tent-pegs, tool-handles, and all purposes demanding great strength (Bed. Gbl. Kurz. Bdn.).

European timbers quoted.—These timbers have a very great deal in common with the Oak (F.W. 44); the colouring is not altogether unlike, the weight is rather greater and the transverse strength very considerably greater, whilst on the other hand the very conspicuous silver-grain of the Oak is wanting, and here we find a resin that gives a yellow or red stain when the timbers are damped. But attention is drawn to the analogies between the two species of Oak and the two species here described; the Peduncled Oak and 212—the harder, heavier and stronger—are exceptionally good for major constructions of every kind whether exposed to weather or underground or under water; the Sessile Oak and 189 are especially useful for carpentry joinery and all kinds of industrial uses rather than for major construction.

Vernaculars.—189 (U) = Piyāsālo; (Tl) = Vēgisa, Yēgi (correctly Vēngi); (Ta) = Vēngai; (M) = Vēnna; (K) = Honne, Ollehonne, Bēnga. 212 (U) = Tāngini, Bōjā; (Tl) = Tangedumānu, Kondatangedu, Erracannangi; (Ta) = Irūl, Iruvēl; (M) = Irul, Irimpullam, Pānnal, Pānkali; (K) = Tiruve, Sivve, Takku, Arasutakku, Bettadāvarike, Hommāvarike, Jambe.

Under 1 *foot diameter of the same category.*—(None.)

Exhibits.—189 (l. and s. panel, l. and s. block). 212 (s. panel, l. block).

IV.—Mostly Very or Extremely Hard.

Reddish or Yellowish (in order of weight).

(64) ROSEWOODS—

	W.	P.	S.	D.	U.	A.	VC.	Localities.
165. Gluta travancorica.	53	730	1	2	1	3	II	TVY., TRV., abdt.
180. Ougeinia dalbergiotdes.	56	835	3	2	1	3	II	Agt., GJM., Nlms., MPLT., WGTS.
184. Dalbergia latifolia.	55	796	1	2	1	2	I	Most dist. better forests.
185. Dalbergia sissoides.	52	720	3	2	1	3	II	MBR., TVY., NLGS., Anms.

Uses.—165 (Tinnevelly Rosewood) (wood bright coppery to dark red mottled and streaked with orange and pale to dark crimson sometimes nearly black with satiny to coppery lustre, very hard and close-grained, very durable, seasons very well, works and polishes admirably, distinctly one of the finest and most beautiful woods in India—Bed. Gbl. Bdn.), furniture and inlaying, most valuable, but very little used because it is generally found in places difficult of access (Bed. Gbl. Bdn.). 180 (Oojein Rosewood or Blackwood) (wood light to dark brown with green yellow or red tints and mottled, hard, close-grained, strong, tough, durable, seasons well, works easily and takes a beautiful polish, the pillars of the Palace of the Maharaja of Sīndhia at Oojein were made of this wood (Bed. Bs. Gbl.), cabinet-work and furniture (excellent), carriage and cart-building especially shafts poles and naves of wheels, agricultural implements especially ploughs (Bed. Bs. Gbl.). 184 (Malabar or Bombay Rosewood or Blackwood) (wood dark purple with Lake-red to black longitudinal lines and streaks, very hard, very strong fibrous close- and fine-grained, durable, seasons well, works easily and takes a fine polish (Bed. Bs. Gbl.), large construction works and found good for sleepers but it is far too valuable for cabinet-work for such a purpose, principally and emphatically for cabinet-work and furniture, also for sculpture and carving and turning, carriages and cart-building especially wheels and also spokes and felloes of gun-carriages, boat-building especially kneed timbers, ploughs and agricultural implements, knife and tool-handles especially Nepalese knives (Bed. Bs. Gbl. Kurz. Bdn.). 185 (Outer Hills Rosewood or Blackwood) (wood purplish brown with darker longitudinal lines or streaks of purple and brown, very much resembling the last 184 but always with a browner or redder tinge, extremely hard, very strong fibrous close—but usually coarse—grained, durable

seasons well, fairly easy to work but less so than the last, takes a good polish but less so than the last (Bed. Bdn.), uses similar to the last. 184, with which till recently it has been considered identical (Bed. Gbl. Bdn.)

European timbers quoted.—There are no European representatives of this category of timbers.

Vernaculars.—166 (Ta) = Cengurangi, Cengurāni, Cencandanam; (M) = Totappi. 180 (U) = Band'hono; (Tl) = Adavicikkudu, Bandanēgi, Nemmi, Tellamotuku; (Ta) = Narivēngai; (M) = Malavēnna, Nēmi; (C) = Bettahonne, Malehonne, Nāyihonne.

Under 1 *foot diameter of the same category.*—None.

Exhibits.—165 (l. and s. panel, l. block); 180 (l. panel). 180 (l. and s. panel, l. and s. block). Also a small table made of 165 and 184 inlaid with ebony.

ABBREVIATIONS.

Wt. in the Synopsis means the average weight of the species in the category.

P. is the coefficient of transverse strength or the weight that, placed in the middle of a beam of given size, would break it; for reference it may be remembered that Oak is 607.

Durability I, II, III, IV, V (see Scheme of Value Classes).

Rays means Medullary or Pith Rays: b. means broad, bb. very broad, bbb. extremely broad; similarly f., ff., fff. mean fine, very fine and extremely fine; a similar abbreviation is made in respect to the pores: l. large, ll. very large, lll. extremely large, s. small, ss. very small, sss. extremely small.

W. in the Details is the average weight of the species.

P. in the Details is the average transverse strength of the species, in the Synopsis it is the average of the species of the category.

S. D. U. A. VC. see abbreviations in the Scheme of Value Classes, briefly, Size, Durability, Utility, Abundance, Value.

(S) (M) (H) (VH) (XH) means that a soft, moderately hard, hard, very hard, or extremely hard timber has, when this is inserted immediately after the specific name, been entered in this category of a different hardness. Sometimes abbreviations for colouring have been similarly inserted, which a reference to the Synopsis description will elucidate.

scat. in the Localities column means		...	scattered.
com.	,,	,, ...	common.
abdt.	,,	,, ...	abundant.
dist.	,,	,, ...	districts.

and in the same column Agt. = Agency Tracts of the Northern Circars. Anms. = Anamalai Hills of Coimbatore and adjoining districts. ATP. = Anantapur District. atts. = arid tracts. bctn. = black cotton soil. KAN. = South Kanara District. CBT. = Coimbatore District. CDP. = Cuddapah District. CHN. = Cochin State. CNTC. = The Carnatic country below ghauts south of Godavari, the Deccan and the Mysore plateau. COCT. = Coromandel Coast. CPT. = Chingleput District. CRG. = Coorg State. DKN. = The Deccan including Kurnool, Cuddapah, Bellary and Anantapur Districts. degn. = dry evergreen forest (see Gamble 129, 623, etc.). dtts. = dry tracts. ECT. = East Coast. epph. = epiphytic.—fswp. = fresh water swamp. GDV. = Godavari District. GJM. = Ganjam District. GTR. = Guntur District. Jprs. = Jeypore Hills of Vizagapatam District. KNL. = Kurnool District. KSN. = Kistna District. Ktlm. = Courtallam. litl. = littoral, along the coast. MBR = Malabar District. Mhgi. = Mahenragiri Hill in Ganjam District. MPLT. = Mysore Plateau including the uplands of Mysore, Bellary, Anantapur, Cuddapah, North Arcot, Salem and Coimbatore districts adjoining Mysore. MRA. =

Madura District. mtts. = moist tracts. MYS. = Mysore State. NAC. = The old North Arcot District. NCCS. = The Northern Circars. NEL. = Nellore District. NLGS. = Nilgiri District. Nlms. = The Nallamallai Hills of Kurnool and Cuddapah. Pgt. = Palghat. Pnis. = The Pulney Hills. ravs. = Ravines. rvrs. = River banks. SAC. = South Arcot District. sarm. = a sarmentose shrub with long trailing branches, not quite a climber. sswp. = salt swamps. Svys. = The Shevaroy hills. TCH. = Trichinopoly District. TJR. = Tanjore District. TRV. = Travancore State. TVY. = Tinnevelly District. VZM. = Vizagapatam District. WFTS. = Western Forests including Mysore, Coorg, South Kanara, Malabar, Cochin, Travancore, Tinnevelly, Pulneys, Anaimalais and Nilgiris. WGTS. = Western Ghauts. Wnd. = The Wynaad. WTCT. = Western Coast.

In the list of Trees, Shrubs and Climbers, t. means a small tree. SH. means a large shrub, and CL. means a large climber.